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16. Abstract

Volume I of this report describes the analytic models developed for computing the periodic sound pressures of subsonic fans and compressors in an infinite, hardwall annular duct with uniform flow. The basic sound-generating mechanism is the scattering into sound waves of velocity disturbances appearing to the rotor or stator blades as a series of harmonic gusts. The models include component interactions and rotor alone. Volume II of this report describes the computer subprograms developed for numerical computations of sound pressure mode amplitudes from the analysis. Volume III presents some test case results from the computer programs.

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CONTENTS

1.0 INTRODUCTION

To support the documentation of the computer subprograms, test cases for the various major computing options of the subprograms have been executed and the results compiled. This volume contains these results as well as a description of the main program utilized for the test case executions. The computer used was the CDC 6600 at the Boeing Computer Services, Inc. facility at Renton, Washington. These cases have been executed on a CDC 6600 computer at the NASA Langley Research Center and the results compared. The computed numbers were the same, showing the subprograms to be essentially system independent since the two computer facilities have quite different systems. Section 2 describes the main driver program and section 3 presents the test case results.

2.0 SAMPLE DRIVER

The sample main program — the sample driver SDRIVER — consists of input through subroutine INPT, printout of the input by subroutine PRNTIN, a call to the primary subroutine, and the printout of the mode amplitudes by subroutine PRNTOUT.

Two special features are available. One, data reduction subroutine DISCOEF, is used with package 3 (BCDAA). This subroutine inputs velocity distortion data and computes the corresponding distortion Fourier coefficients that are stored in array AR. In the use of package 4 (BBCAA), a summation of the mode amplitudes over eddies is available. The above two special features are available through the extended definitions of ARMISC(22) and ARMISC(26), respectively.

2.1 Usage of Sample Driver

2.1.1 Control Cards and Deck Structure

Process number card
JOB card
USER card
LINECNT (10000) (if optional printout is desired)
RUN(S)
LGO.
7-8-9 card

Source deck of the subroutine package

7-8-9 card
Data deck
7-8-9 card
6-7-8-9 card

2.1.2 Data Deck. — There is one sample driving program for all packages. Only one package may be used in any one execution of the sample driving program. The following paragraphs describe how to set up the data deck.

The first card must have one of the following in the first five columns: AAAAA, AABAA, BCDAA, or BBCAA. Then the data deck consists of one or more cases which are stacked sequentially. Each case is defined by specifying the array ARMISC, the array AR, and, under certain conditions, angular distortion data.

The first five cards of a case are used to input the array ARMISC, which has dimension 40. Input the 40 values, ARMISC(1) through ARMISC(40), in the format FORMAT (8F10.2). Not all 40 values are used and some values refer to a particular package only. The user should know which values are needed. Most elements of array ARMISC are defined in the FORTRAN dictionary (vol. II, sec. 2.2). The two exceptions are:

ARMISC(22) In package 3 (BCDAA), ARMISC(22) = 4 means that velocity distortion data is to be input. Subroutine DISCOEF is called by the sample driver, SDRIVER, and computes Fourier coefficients of this data according to ARMISC(23) and ARMISC(24). Finally, ARMISC(22) is set to 3 and package 3 is called.

AMRISC(26) This is used in package 4 (BBCAA) for accumulation of the eddies, which takes place in the sample driver, SDRIVER.

0 or blank means do not sum over eddies
do not put any nonzero value in ARMISC(26) when using other packages

1 means start summing over the eddies beginning with this case

2 means sum over eddies

3 means sum over eddies ending with this case

It is assumed that when the user wants to sum C cases over eddies, he changes only the eddy data, ARMISC(28) through ARMISC(37) in these C cases.

The next card (sixth card) indicates which component (inlet stator, rotor, outlet stator) data is required in the array AR. This card must:

1) Have a 1 in column 5 if inlet stator data is required

2) Have a 1 in column 10 if rotor data is required

3) Have a 1 in column 15 if outlet stator data is required

Next, the array AR is input. Its elements are completely defined in the FORTRAN dictionary. Input data by components: first, input AR(I, J,1) for all I,J if inlet stator data is required; next, input AR(I,J,2) for all I,J if rotor data is required; and, finally, input AR(I,J,3) for all I,J if outlet stator data is required. For a given component, K:

1) Input AR(1,J,K) for all J.

2) Input AR(2,J,K) for all J.

3) If spanwise data is required, input AR(3,J,K) for all J, AR(4,J,K) for all J, etc.

Now, for given K and I, input AR(I,1,K), AR(I,2,K), AR(I,3,K), ..., with format FORMAT (9F8.2).

Finally, in package 3 (BCDAA), if velocity distortion data is required (ARMISC[22] = 4), it is input now. Input the first card with format FORMAT(16I5) where:

1) Columns 1-5 contain the number of angles, which must be $\leq$ 40

2) Columns 6-10 contain NSPAND, where:

   AR(1,1,2) if spanwise velocity distortion data is desired; it must be specified at the radial coordinates AR(3,1,2), AR(4,1,2), ..., AR(m,1,2), m = 2 + AR(1,1,2)

   0 if average values are to be used

Next, input the angles using format FORMAT (8F10.4).

If NSPAND = 0, input average distortion values. These must be input per angle as the angles were input using format FORMAT (8F10.4).

If NSPAND $\neq$ 0, input distortion values:

1) At first radial position for each angle as the angles were input using format FORMAT (8F10.4)

2) At second radial position as in item 1 above

   .

   .

   .

3) At last radial position as in item 1 above

2.2 FORTRAN Listing of Sample Driver

```
      PROGRAM SDRIVER(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C
C PURPOSE      SAMPLE MAIN PROGRAM FOR THE PRIMARY SUBROUTINE
C
      DIMENSION AR(20,40,3),ARMISC(40),ARMUMN(40,50),MAXN(50),MUSE(50)
      COMPLEX ALPHAMN(40,50),ASUM(40,50)
      DIMENSION KIN(3)
      DATA MDIM,NDIM,MAXDIM,MAXJ/50,40,20,40/
      DATA ICASE/0/
C
      DIMENSION V(20,40)
      DATA MAXPHI/40/
C
C
C             READ PRIMARY SUBROUTINE NAME
C
      READ(5,5) IPRG
    5 FORMAT(A5)
C
C             RETURN POINT FOR NEXT CASE
C
   10 CONTINUE
      LAST = 0
C
C             CALL SUBROUTINE INPT TO READ THE NEXT DATA CASE
C
      CALL INPT( *   NARMISC,ARMISC,MAXDIM,MAXJ,AR,KIN,NOFJ,ICASE,IEND)
C
C             CHECK IF LAST CASE
C
      IF( IEND.NE.0 ) GO TO 1000
C
C             CALL SUBROUTINE DISCOEF TO INPUT THE DISTORTION
C             AND COMPUTE THE CORRESPONDING FOURIER COEFFICIENTS,
C             PLACING THE RESULTS IN AR
C
      IF(ARMISC(22).EQ.4)CALL DISCOEF(ARMISC,MAXDIM,MAXJ,AR,KIN,NOFJ,
     1MAXPHI,V,ICASE)
C
C             CALL SUBROUTINE PRNTIN TO PRINTOUT THE INPUT DATA
C
      CALL PRNTIN(IPRG,ICASE,NARMISC,ARMISC,MAXDIM,MAXJ,AR,NOFJ,KIN)
C
C             UPDATE ARMISC WHEN DISCOEF IS USED
C
      IF( ARMISC(22).EQ.4) ARMISC(22)=3
C
C             CALL THE PRIMARY SUBROUTINE TO COMPUTE MODAL AMPLITUDES
C
      IF(IPRG.EQ.5HAAAAA) CALL AAAAA(ARMISC,MAXDIM,MAXJ,AR,MDIM,NDIM,
     1ARMJMN,NOFM,MUSE,MAXN,ALPHAMN,IERROR)
C
```

```
      IF(IPRG.EQ.5HAABAA) CALL AABAA(ARMISC,MAXDIM,MAXJ,AR,MDIM,NDIM,
     1ARMJMN,NOFM,MUSE,MAXN,ALPHAMN,IERROR)
C
      IF(IPRG.EQ.5HBCDAA) CALL BCDAA(ARMISC,MAXDIM,MAXJ,AR,MDIM,NDIM,
     1ARMJMN,NOFM,MUSE,MAXN,ALPHAMN,IERROR)
C
      IF(IPRG.EQ.5HBBCAA) CALL BBCAA(ARMISC,MAXDIM,MAXJ,AR,MDIM,NDIM,
     1ARMJMN,NOFM,MUSE,MAXN,ALPHAMN,IERROR)
C
   50 CONTINUE
      IF(LAST .EQ. 0)    WRITE(6,60)
      IF(LAST .EQ. 1)    WRITE(6,70)
 60   FORMAT(1H1)
 70   FORMAT(1H1,11X,*ACCUMULATION OF EDDYS*)
C
C
C              CALL SUBROUTINE PRNTOUT TO PRINTOUT THE MODAL AMPLITUDES
C
      IF(IERROR.NE.4) CALL PRNTOUT(MDIM,NDIM,NOFM,MUSE,MAXN,ALPHAMN)
C
C
      IF(ARMISC(26) .EQ. 0.)    GO TO 10
      IF(ARMISC(26) - 2.)       500,550,600
 500  DO 510 N=1,NDIM
      DO 510 M=1,MDIM
 510  ASUM(N,M) = ALPHAMN(N,M)
      GO TO 10
 550  DO 560 N=1,NDIM
      DO 560 M=1,MDIM
 560  ASUM(N,M) = ASUM(N,M) + ALPHAMN(N,M)
      GO TO 10
 600  IF(LAST .EQ. 1)     GO TO 10
      DO 610 N=1,NDIM
      DO 610 M=1,MDIM
 610  ALPHAMN(N,M) = ASUM(N,M) + ALPHAMN(N,M)
      LAST = 1
      GO TO 50
C
 1000 CONTINUE
C
      RETURN
      END
```

2.3 Sample Driver Subroutine Descriptions

2.3.1 Subroutine INPT

Purpose: This subroutine provides a standardized input on TAPE 5 of arrays AR and ARMISC. This subroutine will be updated as primary subroutines are developed.

Method: The procedure is as follows:

1) Determine the number of elements in ARMISC.

2) Input ARMISC.

3) Check for an END OF FILE and return upon detection.

4) Update the case counter.

5) Input which components, K, are to be input.

6) For each component to be input, perform steps 7 to 9 below.

7) Compute the number of J's to be used.

8) Input AR for I equal to 1 and 2.

9) When there is spanwise data, input AR for the remaining I's.

Usage: CALLING SEQUENCE

```
DIMENSION ARMISC (NARMISC), AR(MAXDIM,MAXJ,3), KIN(3)
.
.
.
```

```
CALL INPT(PROG,NARMISC,ARMISC,MAXDIM,MAXJ,
*  AR,KIN,NOFJ,ICASE,IEND)
```

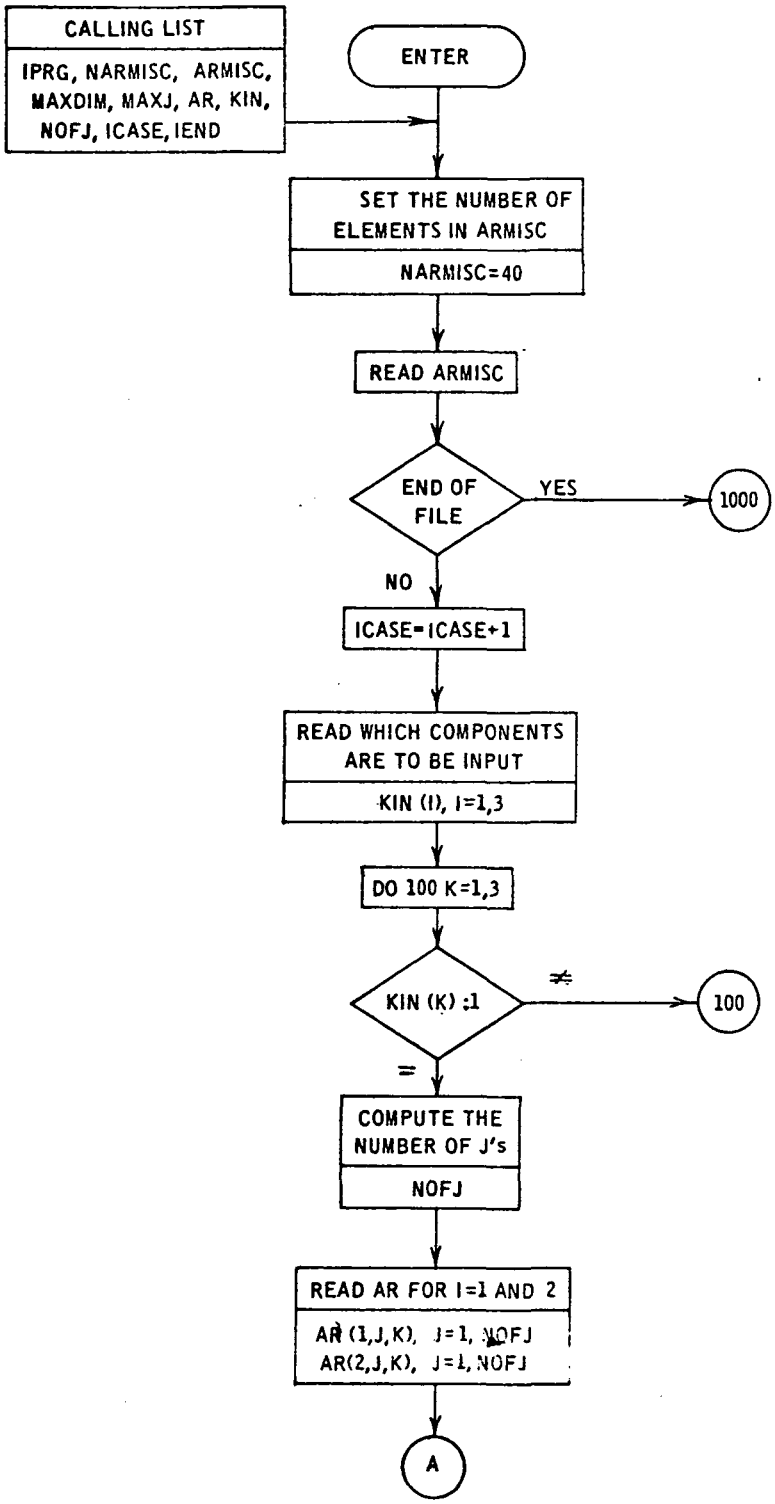
INPUT

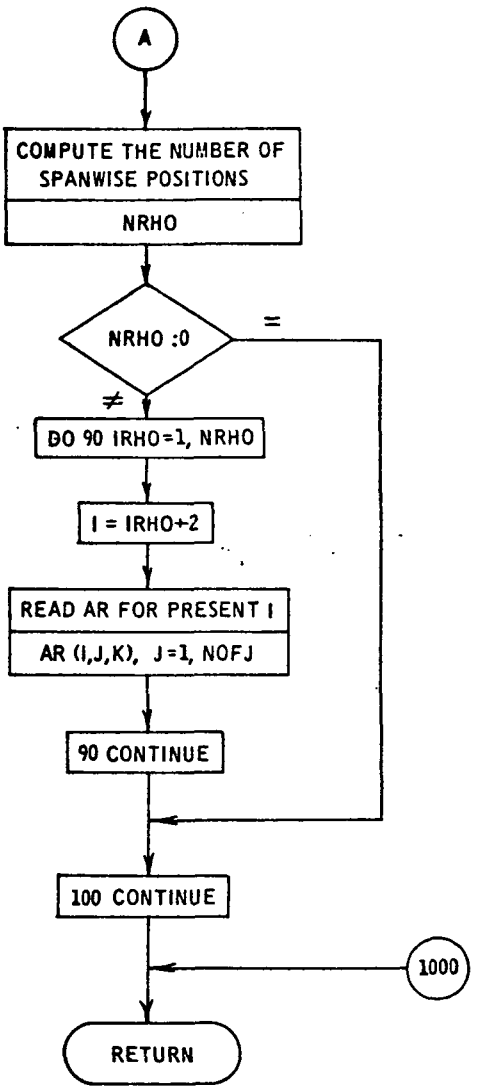
OUTPUT

NARMISC	The number of elements in the array ARMISC, set to 40
ARMISC to AR	See FORTRAN dictionary
KIN	KIN(K), K = 1, 2, 3 is 1 or 0, depending on whether component K is input or not, respectively
ICASE	The case counter, which should be initialized to zero before the first call to this subroutine
IEND	= 1: an END OF FILE is encountered; presumably the previous case is the last case
	= 0: no END OF FILE

Timing: The timing is proportional to the number of elements in ARMISC and AR.

Tapes: TAPE 5 is used for input.


CALLING LIST
IPRG, NARMISC, ARMISC, MAXDIM, MAXJ, AR, KIN, NOFJ, ICASE, IEND
ENTER
SET THE NUMBER OF ELEMENTS IN ARMISC
NARMISC=40
READ ARMISC
END OF FILE
YES
1000
NO
ICASE=ICASE+1
READ WHICH COMPONENTS ARE TO BE INPUT
KIN (I), I=1,3
DO 100 K=1,3
KIN (K) :1
≠
100
=
COMPUTE THE NUMBER OF J's
NOFJ
READ AR FOR I=1 AND 2
AR (1,J,K), J=1, NOFJ
AR(2,J,K), J=1, NOFJ
A


A
COMPUTE THE NUMBER OF SPANWISE POSITIONS
NRHO
NRHO :0
=
≠
DO 90 IRHO=1, NRHO
I = IRHO+2
READ AR FOR PRESENT I
AR (I,J,K), J=1, NOFJ
90 CONTINUE
100 CONTINUE
1000
RETURN

```
      SUBROUTINE INPT(     NARMISC,ARMISC,MAXDIM,MAXJ,AR,KIN,NOFJ,ICASE,
     1IEND)
C
C PURPOSE      THIS PROGRAM PROVIDES FOR STANDARDIZED INPUT
C
      DIMENSION ARMISC(1),AR(MAXDIM,MAXJ,3),KIN(3)
C
      NARMISC = 40
C
C             INPUT ARMISC
C
      READ(5,20)(ARMISC(I),I=1,NARMISC)
   20 FORMAT(8F10.2)
C
C             CHECK FOR END OF FILE AND SET IEND ACCORDINGLY
C
      IF(EOF,5)30,40
   30 IEND=1
      GO TO 1000
   40 IEND=0
C
C             UPDATE THE CASE COUNTER
C
      ICASE = ICASE + 1
C
C             INPUT KIN(K), K=1,2,3 WHERE KIN(K) IS 0 OR 1 DEPENDING
C             UPON WHETHER INPUT FOR COMPONENT K IS TO BE INPUT
C             BELOW OR NOT
C
      READ(5,50) (KIN(I),I=1,3)
   50 FORMAT(16I5)
C
C             LOOP ON THE K INDEX
C
      DO 100 K=1,3
      IF( KIN(K).NE.1) GO TO 100
C
C             COMPUTE THE NUMBER OF ELEMENTS J TO READ
      MISC22=ARMISC(22)
      NGCOEF = ARMISC(18+K)
      NOFFA=0
      IF(ARMISC(25).EQ.3)NOFFA=2
      NOFA1=0
      IF(MISC22.EQ.2)NOFA1=1
      NDCOEF = 0
      IF(MISC22.EQ.3)NDCOEF =ARMISC(23)
      NOFJ=9+NGCOEF +NOFFA+NOFA1+NDCOEF
C
C
C             INPUT AR FOR I = 1 AND 2 ALWAYS
C
      READ(5,60) (AR(1,J,K),J=1,NOFJ)
```

```
   60 FORMAT(9F8.0)
      READ(5,70) (AR(2,J,K),J=1,NOFJ)
   70 FORMAT(9F8.2)
C
C              INPUT AR FOR I = 2 AND ABOVE ONLY WHEN AR(1,1,K)
C              IS NOT ZERO
C
      NRHO = AR(1,1,K)
      IF( NRHO.EQ.0 )GO TO 100
      DO 90 IRHO=1,NRHO
      I = IRHO + 2
   90 READ(5,70) (AR(I,J,K),J=1,NOFJ)
C
  100 CONTINUE
C
 1000 RETURN
      END
```

2.3.2 Subroutine DISCOEF

Purpose: This subroutine inputs distortion data on logical unit TAPE 5 per component (K = 1, 2, or 3) as average values or per spanwise positions (see AR) and per angle (up to 40), prints out the values input, calculates the Fourier series according to ARMISC data, and places the resulting data in AR.

Method: The procedure is as follows:

1) Print a title and case number.

2) Perform the following steps for each component input.

3) Input the number of angles, up to 40 and at least 2, and a parameter that the distortion will be given at the spanwise positions in AR or as average values.

4) Input the angles in degrees.

5) Input the distortion per angle when only average values are input.

6) Otherwise, per spanwise position, input the distortion per angle.

7) Print out the component index.

8) For printout, divide the number of angles into groups of 5 and for each group perform steps 9 and 10.

9) Print the angles in the present group.

10) Print the distortion according to the input in steps 5 and 6.

11) Compute the number of Fourier series indexes and the index multiplication factor.

12) For the average values or for each spanwise position, repeat steps 13 and 16.

13) Set the I index for AR.

14) For each Fourier series index, repeat steps 15 and 16.

15) Compute the Fourier series sine and cosine coefficients by integration over angle using the trapezoidal rule.

16) Store the coefficients calculated in AR.

17) Update the number of J's.

Usage: CALLING SEQUENCE

```
DIMENSION ARMISC(NARMISC),AR(MAXDIM,MAXJ,3),KIN(3),
*  V(MAXDIM,MAXPHI)
 .
 .
 .
CALL DISCOEF (ARMISC,MAXDIM,MAXJ,AR,KIN,NOFJ,MAXPHI,V,ICASE)
```

INPUT

ARMISC	
MAXDIM	See FORTRAN dictionary
MAXJ	
KIN	Array of components input; see subroutine INPT

MAXPHI — Second dimension of array V set in calling program corresponding to the maximum number of angles

ICASE — Case number

INPUT/OUTPUT

AR — See FORTRAN dictionary for definition; this will contain the computed Fourier coefficients

NOFJ — The number of J positions used

OUTPUT

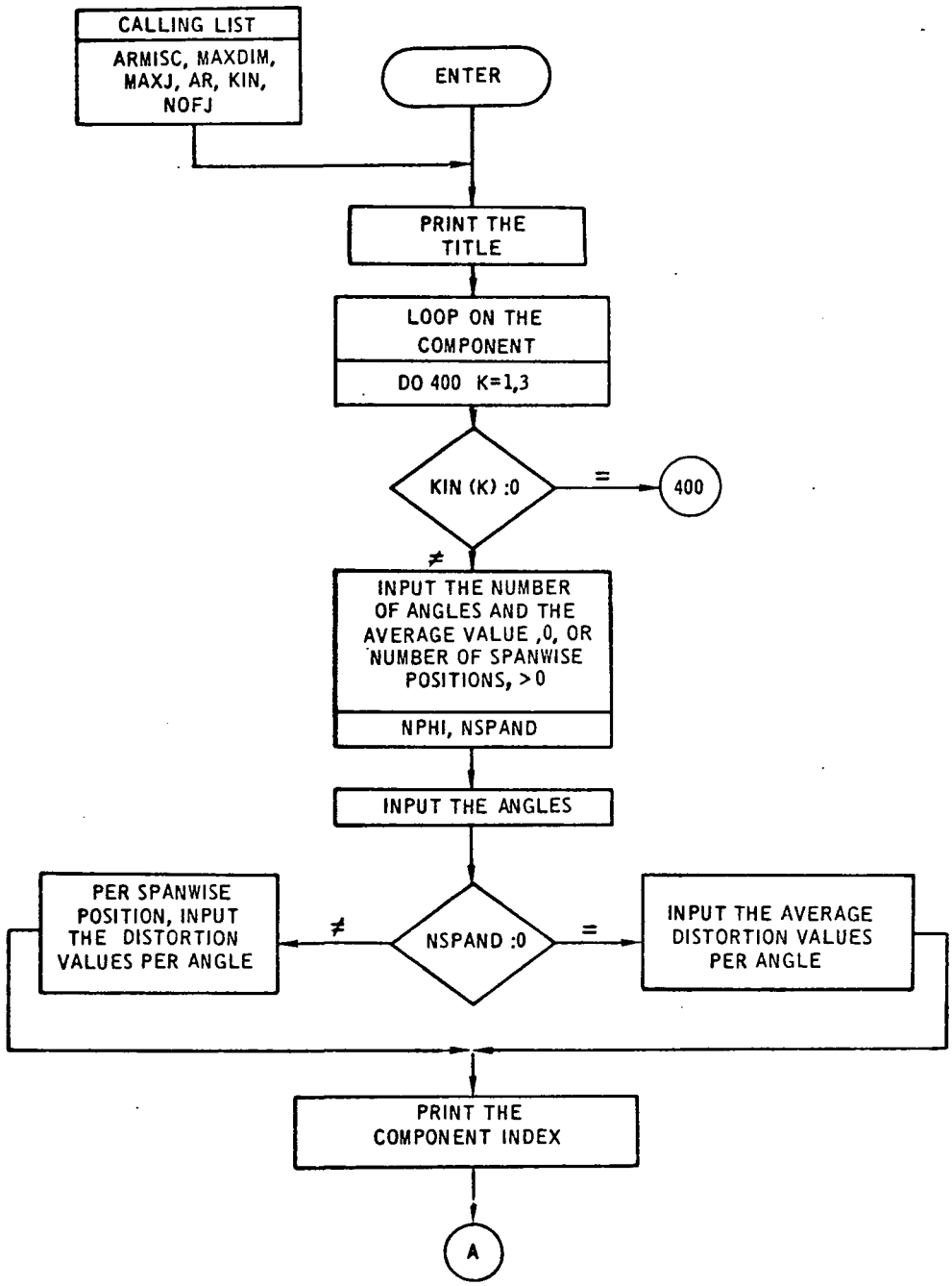
V — The array of input distortion values, dimensioned V(MAXDIM,MAXPHI), where the rows correspond to spanwise data and the columns correspond to angle data

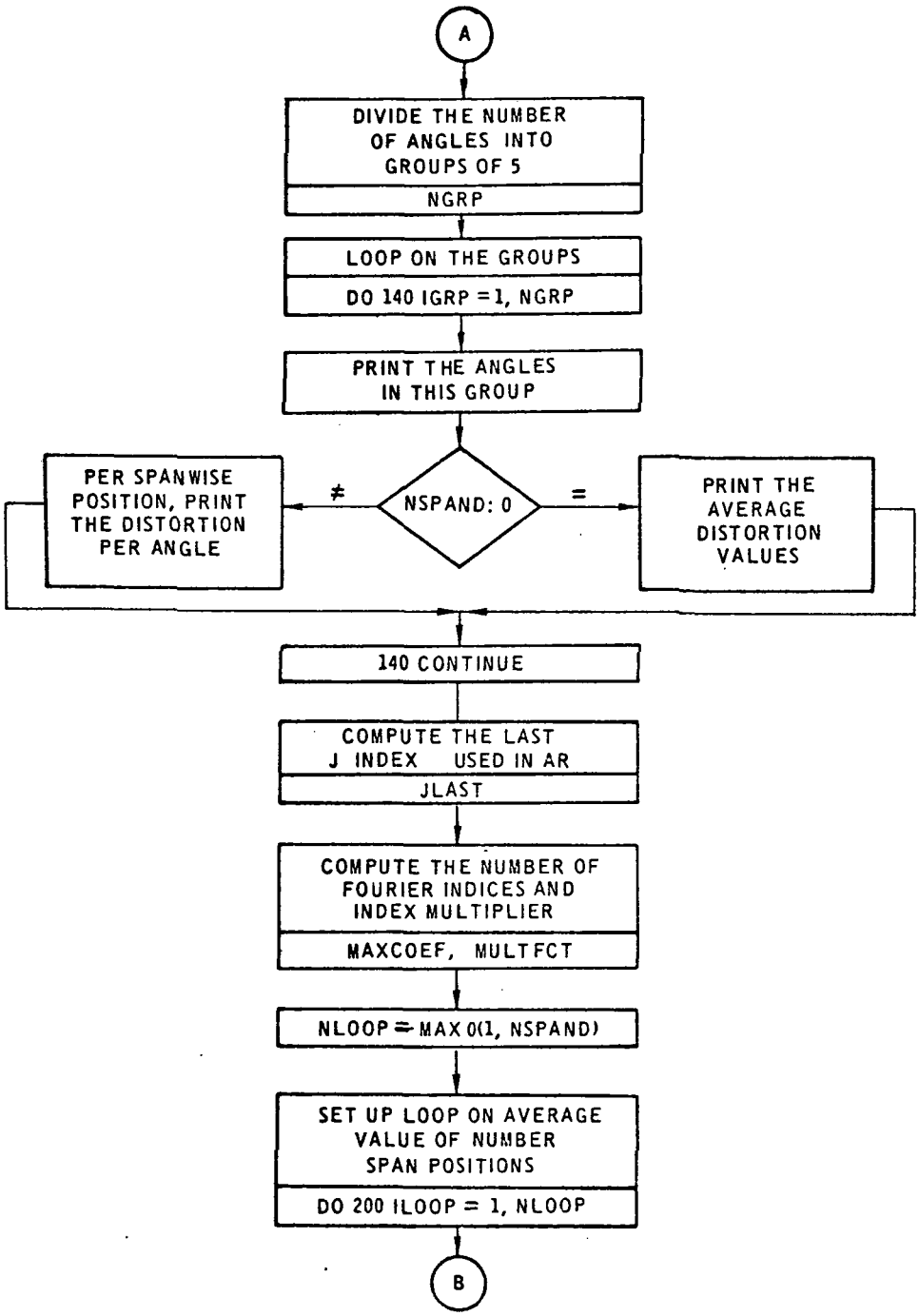
Restrictions: There must be at least two angles, but at most MAXPHI which is set to 40 in SDRIVER. The spanwise positions (unless average values) must be those in array AR.

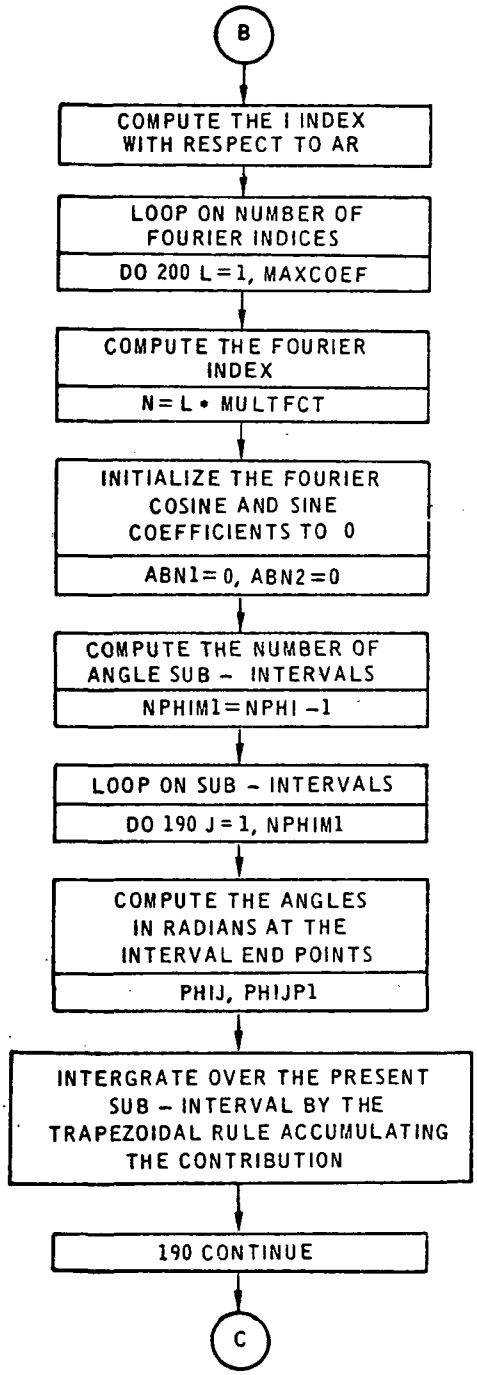
Printout: The distortion values input will be printed out.

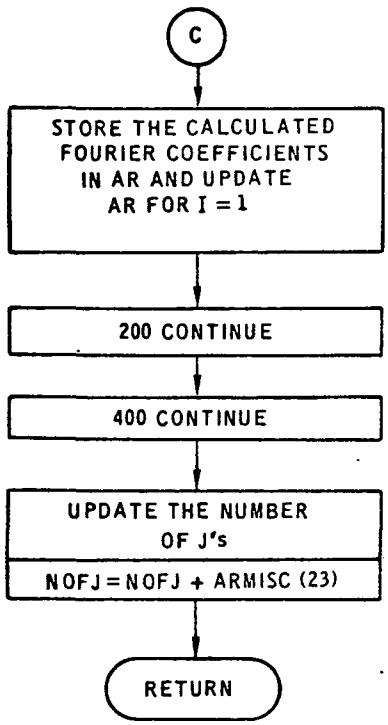
Timing: The timing is proportional to MAXDIM x MAXPHI.

Tapes: TAPE 5 is used for input and TAPE 6 is used for output.


CALLING LIST
ARMISC, MAXDIM, MAXJ, AR, KIN, NOFJ
ENTER
PRINT THE TITLE
LOOP ON THE COMPONENT
DO 400 K=1,3
KIN (K) :0
=
400
≠
INPUT THE NUMBER OF ANGLES AND THE AVERAGE VALUE ,0, OR NUMBER OF SPANWISE POSITIONS, >0
NPHI, NSPAND
INPUT THE ANGLES
PER SPANWISE POSITION, INPUT THE DISTORTION VALUES PER ANGLE
≠
NSPAND :0
=
INPUT THE AVERAGE DISTORTION VALUES PER ANGLE
PRINT THE COMPONENT INDEX
A


A
DIVIDE THE NUMBER OF ANGLES INTO GROUPS OF 5
NGRP
LOOP ON THE GROUPS
DO 140 IGRP = 1, NGRP
PRINT THE ANGLES IN THIS GROUP
NSPAND: 0
≠
PER SPANWISE POSITION, PRINT THE DISTORTION PER ANGLE
=
PRINT THE AVERAGE DISTORTION VALUES
140 CONTINUE
COMPUTE THE LAST J INDEX USED IN AR
JLAST
COMPUTE THE NUMBER OF FOURIER INDICES AND INDEX MULTIPLIER
MAXCOEF, MULTFCT
NLOOP = MAX 0(1, NSPAND)
SET UP LOOP ON AVERAGE VALUE OF NUMBER SPAN POSITIONS
DO 200 ILOOP = 1, NLOOP
B


B
COMPUTE THE I INDEX WITH RESPECT TO AR
LOOP ON NUMBER OF FOURIER INDICES
DO 200 L=1, MAXCOEF
COMPUTE THE FOURIER INDEX
N=L * MULTFCT
INITIALIZE THE FOURIER COSINE AND SINE COEFFICIENTS TO 0
ABN1=0, ABN2=0
COMPUTE THE NUMBER OF ANGLE SUB - INTERVALS
NPHIM1=NPHI -1
LOOP ON SUB - INTERVALS
DO 190 J=1, NPHIM1
COMPUTE THE ANGLES IN RADIANS AT THE INTERVAL END POINTS
PHIJ, PHIJP1
INTERGRATE OVER THE PRESENT SUB - INTERVAL BY THE TRAPEZOIDAL RULE ACCUMULATING THE CONTRIBUTION
190 CONTINUE
C


C
STORE THE CALCULATED FOURIER COEFFICIENTS IN AR AND UPDATE AR FOR I = 1
200 CONTINUE
400 CONTINUE
UPDATE THE NUMBER OF J's
NOFJ = NOFJ + ARMISC (23)
RETURN

```
      SUBROUTINE DISCOEF(ARMISC,MAXDIM,MAXJ,AR,KIN,NOFJ,MAXPHI,V,ICASE)
C
C PURPOSE      THIS IS A DATA REDUCTION SUBROUTINE WHICH INPUTS
C              DISTORTION, ARMISC(22)=4, VALUES PER SPAN POSITION, THOSE
C              IN AR, FOR A SET OF ANGLES, PRINTS OUT THOSE VALUES,
C              COMPUTES THE FOURIER COEFFICIENTS ACCORDING TO ARMISC(23)
C              AND ARMISC(24) AND PLACES THOSE VALUES IN AR
C
      DIMENSION ARMISC(1),AR(MAXDIM,MAXJ,3),V(MAXDIM,MAXPHI),KIN(3)
      DATA DTOR/0.01745329251994/,TWOPI/6.28318530717959/
C
C             INPUT THE DISTORTION V(I,J) WHERE I=1,CORRESPONDS TO THE
C             ANGLE, I=2 TO THE AVERAGE VALUE, I=3,4,... TO SPANWISE
C             POSITIONS AR(I,1,K), J=1,2,... CORRESPOND TO ANGLES
C
C             PRINT TITLE
C
      WRITE(6,5)ICASE
    5 FORMAT(1H1//11X,*DISTORTION INPUT FOR CASE *,I3)
C
C             LOOP ON COMPONENT
C
      DO 400 K=1,3
      IF( KIN(K).EQ.0 ) GO TO 400
C
C             INPUT NPHI, THE NUMBER OF ANGLES, AT MOST 40, AND
C             NSPAND, 0 IF ONLY AVERAGE VALUES OF DISTORTION ARE GIVEN
C             OR EQUAL TO AR(1,1,K) FOR SPANWISE DATA
C
      READ(5,10) NPHI,NSPAND
   10 FORMAT(16I5)
C
C             INPUT THE ANGLE IN DEGREES
C
      READ(5,20) (V(1,J),J=1,NPHI)
   20 FORMAT(8F10.4)
C
      IF( NSPAND ) 40,30,40
C
C             INPUT THE AVERAGE DISTORTION VALUES
C
   30 READ(5,20) (V(2,J),J=1,NPHI)
      GO TO 60
C
C             INPUT THE DISTORTION PER SPANWISE POSITION
C
   40 DO 50 ISPAND=1,NSPAND
      I = ISPAND + 2
   50 READ(5,20) (V(I,J),J=1,NPHI)
C
C             PRINTOUT THE DISTORTION INPUT
```

```
C
C               PRINT THE COMPONENT
C
   60 WRITE(6,70) K
   70 FORMAT(1H0,10X,*K = *,I1)
C
C               DIVIDE THE ANGLES INTO GROUPS OF 5 FOR COLUMN OUTPUT
C
      NGRP = (NPHI-1)/5 + 1
      DO 140 IGRP=1,NGRP
C
C               COMPUTE THE FIRST AND LAST J INDEX WITH RESPECT TO
C               V FOR THE PRESENT GROUP OF 5
C
      J1 = (IGRP-1)*5 + 1
      J2 = MIND(J1+4,NPHI)
C
C               PRINT THE ANGLES
C
      WRITE(6,80) (V(1,J),J=J1,J2)
   80 FORMAT(1H0,10X,* ANGLE  = *,5F10.4)
C
      IF( NSPAND ) 110,90,110
C
C               PRINT AVERAGE DISTORTION VALUES
C
   90 WRITE(6,100) (V(2,J),J=J1,J2)
  100 FORMAT(1H0,10X,*AVERAGE = *,5F10.4)
      GO TO 140
C
C               PRINT DISTORTION VALUES PER SPANWISE POSITION
C
  110 WRITE(6,115)
  115 FORMAT(13X,*SPAN*)
      DO 120 ISPAND=1,NSPAND
      I = ISPAND + 2
  120 WRITE(6,130) AR(I,1,K),(V(I,J),J=J1,J2)
  130 FORMAT(11X,F6.4,5F10.4)
C
  140 CONTINUE
C
C               CALCULATE THE DISTORTION FOURIER SERIES
C
C
C               COMPUTE THE LAST J INDEX USED WITH RESPECT TO AR
C
      JLAST = NOFJ
C
C               COMPUTE THE FACTORS DETERMINING THE FOURIER INDICES
C
      MAXCOEF = ARMISC(23)/2
      MULTFCT = ARMISC(24)
C
```

```
C
C               LOOP ON THE AVERAGE VALUE OR SPANWISE POSITION INDEX
C               SETTING THE I APPROPRIATE TO BOTH V AND AR
C
      NLOOP = MAXO(1,NSPAND)
      DO 200 ILOOP=1,NLOOP
      I = ILOOP + 2
      IF( NSPAND.EQ.0) I=2
C
C               LOOP ON NUMBER OF FOURIER SERIES COEFFICIENTS
C
      DO 200 L=1,MAXCOEF
C
C               COMPUTE THE FOURIER SERIES INDEX
C
      N = L*MULTFCT
C
C               COMPUTE THE FOURIER COSINE AND SINE COEFFICIENT FOR
C               THE PRESENT SPAN POSITION AND FOURIER SERIES INDEX
C               BY INTEGRATING OVER THE ANGLE USING THE TRAPEZOIDAL RULE
C
C               INITIALIZE THE COEFFICIENT SUM
C
      ABN1 = 0.
      ABN2 = 0.
C
C               LOOP ON THE SUB-INTERVALS
C
      NPHIM1 = NPHI - 1
      DO 190 J=1,NPHIM1
C
C               SET THE ANGLES AND COSINE AND SINE ARGUMENTS
C               AT THE INTERVAL END POINTS
C
      JP1 = J+1
      PHIJP1 = V(1,JP1) *DTOR
      PHIJ   = V(1,J)*DTOR
      ARGNJP1= N*PHIJP1
      ARGNJ  = N*PHIJ
C
C               COMPUTE THE TRAPEZOIDAL RULE CONTRIBUTION
C
      ABN1=ABN1+(PHIJP1-PHIJ)*(V(I,JP1)*COS(ARGNJP1)+V(I,J)*COS(ARGNJ))
  190 ABN2=ABN2+(PHIJP1-PHIJ)*(V(I,JP1)*SIN(ARGNJP1)+V(I,J)*SIN(ARGNJ))
      ABN1=   ABN1*MULTFCT
      ABN2=   ABN2*MULTFCT
C
C               STORE THE COEFFICIENT IN AR
C
      JNEXT = JLAST + 2*(L-1)+1
      AR(I,JNEXT,K) = ABN1
      AR(I,JNEXT+1,K)=ABN2
      AR(1,JNEXT,K) = NSPAND
```

```
      AR(1,JNEXT+1,K)=NSPAND
  200 CONTINUE
C
  400 CONTINUE
C
C                 UPDATE NOFJ
C
      NOFJ = NOFJ + ARMISC(23)
C
      RETURN
      END
```

2.3.3 Subroutine PRNTIN

Purpose: This subroutine provides for a standardized output on TAPE 6 of the arrays ARMISC and AR.

Method: The procedure is as follows:

1) Print the case number.

2) Print the array ARMISC.

3) For each component K input, repeat the following steps.

4) Divide the number of I's into groups of 6 per line.

5) For each group of I's, print AR for all J's in that group and all I's.

Usage: CALLING SEQUENCE

```
DIMENSION ARMISC(NARMISC),AR(MAXDIM,MAXJ,3),KIN(3)
.
.
.
CALL PRNTIN(IPRG,ICASE,NARMISC,ARMISC,
*   MAXDIM,MAXJ,AR,NOFJ,KIN)
```

INPUT

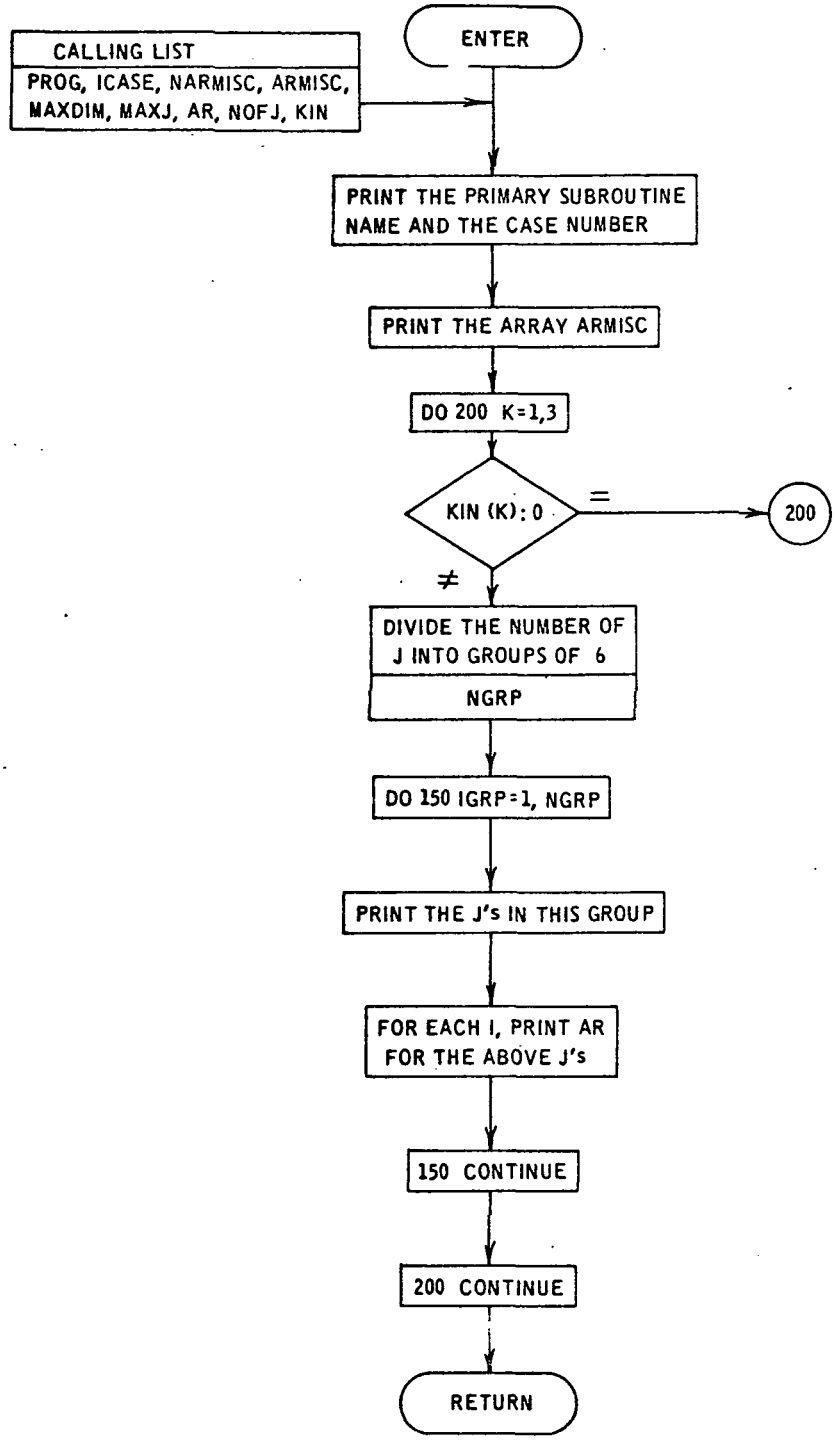
IPRG — The five-letter name (5Hxxxxx) of the primary subroutine being used

ICASE — The number of the case

NARMISC	Number of elements in ARMISC
ARMISC to AR	See FORTRAN dictionary
NOFJ	The number of J's in AR
KIN	KIN(K), K = 1, ..., 3 is 1 or 0 depending on whether component K data is to be printed (i.e., input)

Timing: The timing is proportional to the number of elements in the arrays ARMISC and AR.

Tapes: TAPE 6 is used for output.


CALLING LIST
PROG, ICASE, NARMISC, ARMISC,
MAXDIM, MAXJ, AR, NOFJ, KIN
ENTER
PRINT THE PRIMARY SUBROUTINE
NAME AND THE CASE NUMBER
PRINT THE ARRAY ARMISC
DO 200 K=1,3
KIN (K): 0
=
200
≠
DIVIDE THE NUMBER OF
J INTO GROUPS OF 6
NGRP
DO 150 IGRP=1, NGRP
PRINT THE J's IN THIS GROUP
FOR EACH I, PRINT AR
FOR THE ABOVE J's
150 CONTINUE
200 CONTINUE
RETURN

```
      SUBROUTINE PRNTIN(IPRG,ICASE,NARMISC,ARMISC,MAXDIM,MAXJ,AR,NOFJ,
     1KIN)
C
C PURPOSE       STANDARDIZED INPUT PRINTOUT SUBROUTINE
C
      DIMENSION ARMISC(NARMISC),AR(MAXDIM,MAXJ,3),KIN(3)
      DIMENSION T1(2)
      DATA T1(1),T1(2)/9H  INDEX  ,9H     VALUE/
C
      WRITE(6,10)IPRG,ICASE
   10 FORMAT(1H1//1HO,10X,*SUBROUTINE *,A5/1HO,10X,*INPUT FOR CASE *,I3)
C
      NCLM=MINO(4,NARMISC)
      NROW=(NARMISC-1)/4 +1
      WRITE(6,20)(T1(1),T1(2),ICLM=1,NCLM)
   20 FORMAT(1HO,10X,*ARRAY ARMISC*/10X,8A9)
      DO 35 IR=1,NROW
      WRITE(6,30) (I,ARMISC(I),I=IR,NARMISC,NROW)
   30 FORMAT(10X,4(4X,I3,1X,F10.4) )
   35  CONTINUE
C
      WRITE(6,40)
   40 FORMAT(/1HO,10X,*ARRAY AR*)
      DO 200 K=1,3
      IF(KIN(K).EQ.0) GO TO 200
      NOFI= AR(1,1,K) + 2
      NGRP= (NOFJ-1)/6+1
   45 WRITE(6,50)K
   50 FORMAT(1HO,11X,*K = *,I1)
      DO 150 IGRP=1,NGRP
      J1=(IGRP-1)*6 +1
      J2=MINO(J1+5,NOFJ)
      WRITE(6,60) (J,J=J1,J2)
   60 FORMAT(1HO,11X,*J =*,6(8X,I2,1X) )
      WRITE(6,70)
   70 FORMAT(1H ,12X,*I*)
      DO 100 I=1,NOFI
      WRITE(6,80) (I,(AR(I,J,K),J=J1,J2)    )
   80 FORMAT(12X,I2,2X,6(1X,F10.5) )
  100 CONTINUE
  150 CONTINUE
  200 CONTINUE
C
      RETURN
      END
```

2.3.4 Subroutine PRNTOUT

Purpose: This subroutine prints out the modal amplitudes, array ALPHAMN, as computed by a primary subroutine.

Method: The procedure is as follows:

1) Print the heading.

2) Divide the number of m's into groups of 3.

3) For each group in step 2, repeat the following steps.

4) Compute the index corresponding to the largest and smallest m in the present group.

5) Compute the largest n corresponding to the m's in this group.

6) For each n, up to the largest, repeat the following steps.

7) Construct a variable format such that for each m in the present group, the format will print blank or the modal amplitude as a modulus and a phase between -180° and 180°, depending on whether there is or is not a modal amplitude corresponding to the current m and n, respectively.

8) Print the information determined in step 7.

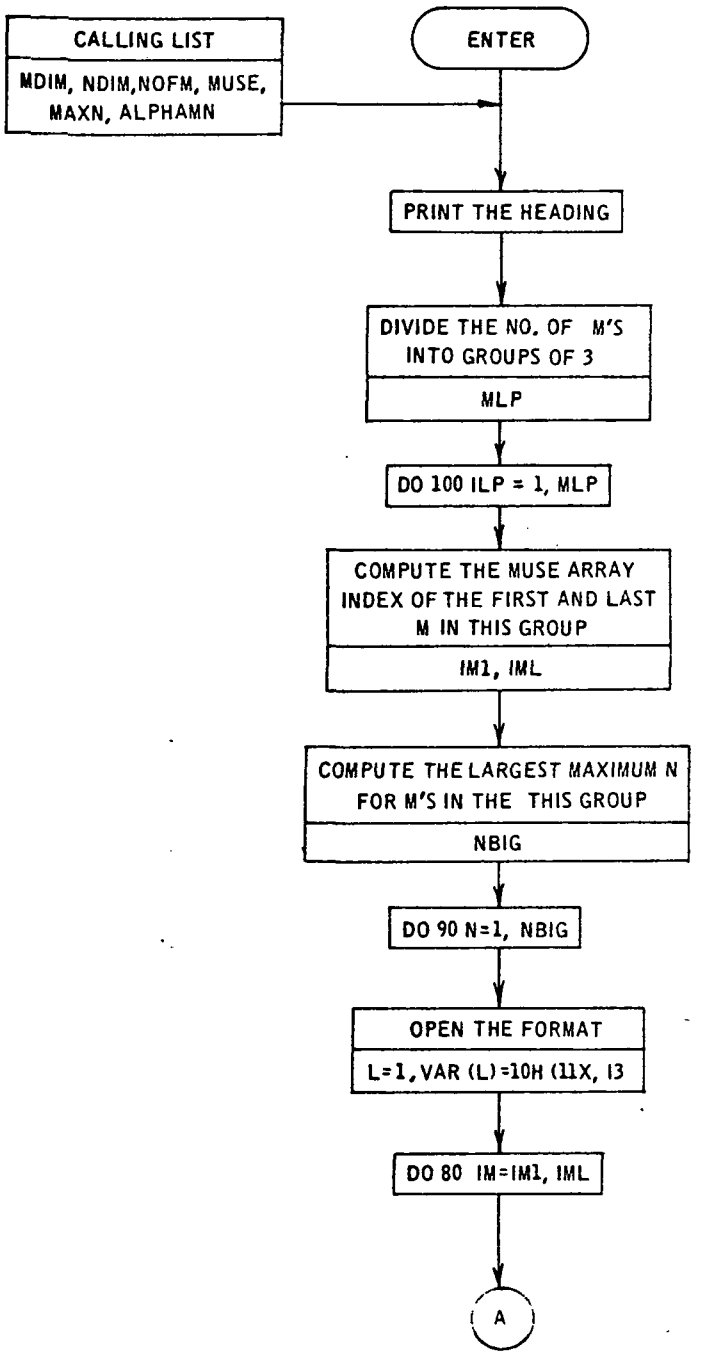
Usage: CALLING SEQUENCE

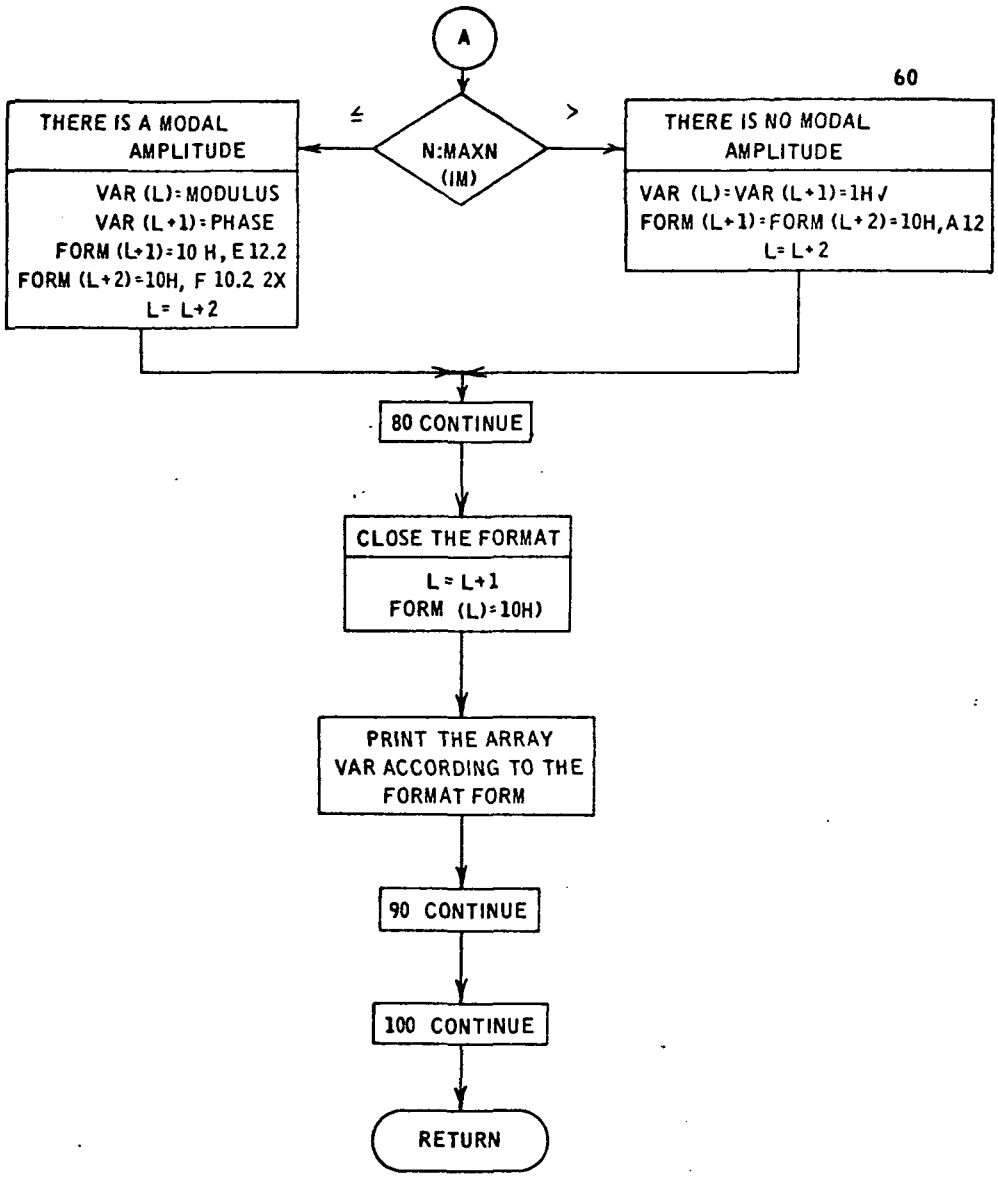
```
DIMENSION MUSE(MDIM),MAXN(MDIM)
```

```
COMPLEX ALPHAMN(NDIM,MDIM)
.
.
.
CALL PRNTOUT(MDIM,NDIM,NOFM,MUSE,MAXN,ALPHAMN)
```

Timing: The timing is proportional to NOFM times the largest value in MAXN.

Tapes: TAPE 6 is used for printout.


CALLING LIST
MDIM, NDIM,NOFM, MUSE, MAXN, ALPHAMN
ENTER
PRINT THE HEADING
DIVIDE THE NO. OF M'S INTO GROUPS OF 3
MLP
DO 100 ILP = 1, MLP
COMPUTE THE MUSE ARRAY INDEX OF THE FIRST AND LAST M IN THIS GROUP
IM1, IML
COMPUTE THE LARGEST MAXIMUM N FOR M'S IN THE THIS GROUP
NBIG
DO 90 N=1, NBIG
OPEN THE FORMAT
L=1, VAR (L)=10H (11X, I3
DO 80 IM=IM1, IML
A


A
60
THERE IS A MODAL AMPLITUDE
VAR (L)=MODULUS
VAR (L+1)=PHASE
FORM (L+1)=10 H, E 12.2
FORM (L+2)=10H, F 10.2 2X
L= L+2
≤
N:MAXN (IM)
>
THERE IS NO MODAL AMPLITUDE
VAR (L)=VAR (L+1)=1H /
FORM (L+1)=FORM (L+2)=10H, A12
L= L+2
80 CONTINUE
CLOSE THE FORMAT
L= L+1
FORM (L)=10H)
PRINT THE ARRAY VAR ACCORDING TO THE FORMAT FORM
90 CONTINUE
100 CONTINUE
RETURN

```
      SUBROUTINE PRNTOUT(MDIM,NDIM,NOFM,MUSE,MAXN,ALPHAMN)
C
C     PURPOSE       STANDARDIZED MODAL AMPLITUDE PRINTOUT
C
      DIMENSION MUSE(MDIM),MAXN(MDIM),VAR(6),FORM(8)
      COMPLEX ALPHAMN(NDIM,MDIM),ALPHA
      DATA ME,BLNK,RADTODG /4HM = ,1H ,57.29577951308232/
      REAL MODULUS
C
      WRITE(6,10)
 10   FORMAT(1HO,11X,*MODAL AMPLITUDES = (MODULUS,PHASE)*/
     1 1HO,13X,*PHASE.LT.180 DEG AND PHASE.GT.-180 DEG*)
C
C               COMPUTE THE NUMBER OF M IN SETS OF 3
C
      MLP =(NOFM-1)/3 + 1
C
C               LOOP ON SETS OF M, COMPUTING THE FIRST AND LAST M
C
      DO 100 ILP=1,MLP
      IM1 = 3*(ILP-1)+1
      IML = MIN0(IM1+2,NOFM)
C
C               PRINT THE M AND COLUMN HEADING N
C
      WRITE(6,20) (ME,MUSE(IM),IM=IM1,IML)
   20 FORMAT(1HO,13X, 3(9X,A4, I4,7X) )
      WRITE(6,30)
   30 FORMAT(13X,*N*)
C
C               COMPUTE THE LARGEST N OVER ALL MIN THIS SET
C
      NBIG = 1
      DO 40 IM=IM1,IML
   40 NBIG = MAXO(MAXN(IM),NBIG)
C
C               LOOPING ON N, CONSTRUCT THE FORMAT
C
      DO 90 N=1,NBIG
C
C               OPEN THE FORMAT AND SET N PRINT FORMAT
C
      L = 1
      FORM(1)=10H(11X,I3
C
C               LOOP ON M, FILLING THE VARIABLE AND FORMAT
C
      DO  80 IM=IM1,IML
C
C               DECISION ON TYPE OF ELEMENT
C
      IF( N-MAXN(IM) )50,50,60
```

```
C
C
C               MODAL AMPLITUDE HERE ONLY
C
   50 ALPHA = ALPHAMN(N,IM)
      MODULUS = CABS(ALPHA)
      IF(MODULUS) 53,52,53
   52 PHASE = 0.
      GO TO 55
   53 PHASE   = ATAN2( AIMAG(ALPHA),REAL(ALPHA) )*RADTODG
   55 VAR(L) = MODULUS
      L =L+1
      FORM(L) = 10H,E12.2
      VAR(L) = PHASE
      L = L+1
      FORM(L) = 10H,F10.2,2X
      GO TO 80
   60 VAR(L) = BLNK
      L = L+1
      FORM(L) = 10H,A12
      VAR(L) = BLNK
      L = L+1
      FORM(L) = 10H,A12
C
   80 CONTINUE
C
C               COMPUTE NUMBER OF WORDS IN FORMAT AND SET LAST ELEMENT
C
      L = L + 1
      FORM( L )=10H)
C
      L = L - 2
      WRITE(6,FORM) N,(VAR(I),I=1, L )
C
   90 CONTINUE
C
  100 CONTINUE
C
      RETURN
      END
```

3.0 TEST CASE RESULTS

The purpose of these test cases is to demonstrate the different options included in the four subroutine packages.

The test cases executed with primary subroutine AAAAA include the evaluation of several options that are common to all four packages. The test cases with the other three packages demonstrate options that are unique for each one of them.

The test cases for the packages AAAAA and BBCAA include base cases. The inputs used for the base cases serve as reference inputs. The inputs for the other test cases are equal to the reference inputs except for one or a few input parameters.

3.1 Primary Subroutine AAAAA

Case	
1	Base case: Viscous wakes interaction between inlet stator and rotor
2	Viscous wakes interaction between rotor and outlet stator: ARMISC(5) = ISOROS = 2.
3	Base case with: ARMISC(14) = harmonic index = 2.
4	Base case with: ARMISC(4) = 1. indicates downstream propagation
5	Base case with: ARMISC(38) = 1. indicates non compact source theory

Case	
6	Base case with: ARMISC(13) - .1 indicates wake skewness at rotor
7	Base case with: AR(1,J,K) = 0. indicates average input values in the AR array only.

3.1.1 Card Image of Main Driver Imput

```
AAAAA
.2          .0          .35         -1.         1.          .0          .875        10.
.0          15.                                             1.          -1.
.0
3.

    1     1     0
2.          2.                      .0                      .0          .0          2.          .0
2.          2.
.675        .15                     .01                     6.28        .5          .53         .5
.05         .05
.35         .2                                                                      .5
.0          .0
1.          .1                                                                      .56
.1          .1
2.          2.                      .0                      .0          2.          2.          .0
2.          2.
.675        .15                     .01                     6.28        .695        .59         .5
.065        .06
.35         .2                                                          .59         .5
.1          .1
1.          .1                                                          .8          .675
.03         .02
.0            .2          .35         -1.         2.            .0            .375
10.         15.                                                 1.                          .0
-1.                     .
3.

    0     1     1
2.          2.                      .0                      .0          2.          2.          .0
2.          2.
.675        .15                     .01                     6.28        .695        .59         .5
.065        .06
.35         .2                                                          .59         .5
.1          .1
1.          .1                                                          .8          .675
.03         .02
2.          2.                      .0                      .0          2.          .0          .0
2.          2.
.675        .15                     .01                     6.28        .63         .5          .5
.15         .1
.35         .2                                                          .59
.15         .1
1.          .1                                                          .675
.15         .1
.2          .0          .35         -1.         1.          .0          .375        10.
.0          15.                                             2.          -1.
.0
3.

    1     1     0
2.          2.                      .0                      .0          .0          2.          .0
```

```
2.          2.
.675        .15                 .01                 6.28        .5          .53         .5
.05         .05
.35         .2                                                              .5
.0          .0
1.          .1                                                              .56
.1          .1
2.          2.                  .0                  .0          2.          2.          .0
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.065        .06
.35         .2                                                  .59         .5
.1          .1
1.          .1                                                  .8          .675
.03         .02
.2            .0          .35          1.          1.            .0            .375          10.
.0            15.                                                 1.            -1.
.0
3.

    1     1     0
2.          2.                  .0                  .0          .0          2.          .0
2.          2.
.675        .15                 .01                 6.28        .5          .53         .5
.05         .05
.35         .2                                                              .5
.0          .0
1.          .1                                                              .56
.1          .1
2.          2.                  .0                  .0          2.          2.          .0
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.065        .06
.35         .2                                                  .59         .5
.1          .1
1.          .1                                                  .8          .675
.03         .02
.2            .0          .35          -1.         1.            .0            .875          10.
.0            15.                                                 1.            -1.
.0
3.
                                                                  1.

    1     1     0
2.          2.                  .0                  .0          .0          2.          .0
2.          2.
.675        .15                 .01                 6.28        .5          .53         .5
.05         .05
.35         .2                                                              .5
.0          .0
1.          .1                                                              .56
.1          .1
2.          2.                  .0                  .0          2.          2.          .0
```

```
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.065        .06
.35         .2                                                  .59         .5
.1          .1
1.          .1                                                  .8          .675
.03         .02
.2            .0          .35          -1.          1.            .0            .875          10.
.0            15.                                  .1            1.            -1.
.0
3.

    1       1       0
2.          2.                  .0                  .0          .0          2.          .0
2.          2.
.675        .15                 .01                 6.28        .5          .53         .5
.05         .05
.35         .2                                                              .5
.0          .0
1.          .1                                                              .56
.1          .1
2.          2.                  .0                  .0          2.          2.          .0
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.065        .06
.35         .2                                                  .59         .5
.1          .1
1.          .1                                                  .8          .675
.03         .02
.2            .0          .35          -1.          1.            .0            .875          10.
.0            15.                                  .1            1.            -1.
.0
3.

    1       1       0

.675        .15                 .01                 6.28        .5          .53         .5
.05         .05


.675        .15                 .01                 6.28        .695        .59         .5
.065        .06
```

3.1.2 Primary Subroutine Input/Output

```
SUBROUTINE AAAAA

INPUT FOR CASE    1

ARRAY ARMISC
 INDEX      VALUE   INDEX      VALUE   INDEX      VALUE   INDEX      VALUE
     1      .2000      11    -0.0000      21    -0.0000      31    -0.0000
     2     0.0000      12    -0.0000      22    -0.0000      32    -0.0000
     3      .3500      13    -0.0000      23    -0.0000      33    -0.0000
     4    -1.0000      14     1.0000      24    -0.0000      34    -0.0000
     5     1.0000      15    -1.0000      25     3.0000      35    -0.0000
     6     0.0000      16    -0.0000      26    -0.0000      36    -0.0000
     7      .8750      17     0.0000      27    -0.0000      37    -0.0000
     8    10.0000      18    -0.0000      28    -0.0000      38    -0.0000
     9     0.0000      19    -0.0000      29    -0.0000      39    -0.0000
    10    15.0000      20    -0.0000      30    -0.0000      40    -0.0000

ARRAY AR

 K = 1

 J =          1          2          3          4          5          6
  I
  1    2.00000    2.00000   -0.00000    0.00000   -0.00000    0.00000
  2     .67500     .15000   -0.00000     .01000   -0.00000    0.23000
  3     .35000     .20000   -0.00000   -0.00000   -0.00000   -0.00000
  4    1.00000     .10000   -0.00000   -0.00000   -0.00000   -0.00000

 J =          7          8          9         10         11
  I
  1    0.00000    2.00000    0.00000    2.00000    2.00000
  2     .50000     .53000     .50000     .05000     .05000
  3    -0.00000    .50000   -0.00000    0.00000    0.00000
  4    -0.00000    .56000   -0.00000     .10000     .10000

 K = 2

 J =          1          2          3          4          5          6
  I
  1    2.00000    2.00000   -0.00000    0.00000   -0.00000    0.00000
  2     .67500     .15000   -0.00000     .01000   -0.00000    0.23000
  3     .35000     .20000   -0.00000   -0.00000   -0.00000   -0.00000
  4    1.00000     .10000   -0.00000   -0.00000   -0.00000   -0.00000

 J =          7          8          9         10         11
  I
  1    2.00000    2.00000    0.00000    2.00000    2.00000
  2     .69500     .59000     .50000     .05500     .06000
  3     .59000     .50000   -0.00000     .10000     .10000
  4     .80000     .67500   -0.00000     .03000     .02000
```

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	4.59E-03	-14.05	2.38E-03	-74.22
2	8.30E-03	-44.27	1.28E-03	-102.38
3	8.70E-03	-45.33	1.80E-03	65.29

SUBROUTINE AAAAA

INPUT FOR CASE 2

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	0.0000	11	-0.0000	21	-0.0000	31	-0.0000
2	.2000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	2.0000	15	-0.0000	25	3.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.8750	17	-1.0000	27	-0.0000	37	-0.0000
8	-0.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	10.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	5.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.06500	.06000
3	.59000	.50000	-0.00000	.10000	.10000
4	.80000	.67500	-0.00000	.03000	.02000

K = 3

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	5.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	0.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.06500	.06000
3	.59000	-0.00000	-0.00000	.10000	.10000
4	.67500	-0.00000	-0.00000	.15000	.10000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	4.93E-04	-83.39	3.22E-03	59.53
2	1.04E-03	-.28	7.50E-03	16.11
3	3.85E-03	-18.56	1.11E-02	-23.72

SUBROUTINE AAAAA

INPUT FOR CASE 3

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	-0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	2.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.05000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.10000	.10000

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.06500	.06000
3	.59000	.50000	-0.00000	.10000	.10000
4	.80000	.67500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -20		M = -10		M = 0	
1	1.97E-03	-103.96	2.08E-03	-21.65	3.62E-03	51.12
2	3.88E-03	-170.45	3.16E-03	-87.34	2.24E-03	1.81
3			3.71E-03	-121.19	7.61E-04	23.53
4			3.78E-03	-122.34	6.79E-04	-40.33
5			3.32E-03	-102.22	4.20E-04	130.65
6			7.37E-03	-63.88	3.95E-04	125.31
7					4.13E-04	-44.63

N	M = 10		M = 20	
1	1.92E-03	-176.85	1.23E-03	-68.23
2	1.75E-03	148.94	2.98E-04	58.23
3	8.02E-04	125.87		
4	4.62E-04	-33.33		
5	1.80E-03	-37.76		
6	6.90E-03	-24.53		

SUBROUTINE AAAAA

INPUT FOR CASE 4

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	-0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = / I	1	2	3	4	5	6
1	2.00000.	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.05000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.10000	.10000

K = 2

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.05000	.05000
3	.59000	.50000	-0.00000	.10000	.10000
4	.80000	.67500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	3.63E-04	-63.08	2.69E-03	96.61
2	2.76E-03	-44.44	4.22E-03	67.53
3	5.50E-03	-43.93	4.60E-03	48.55

SUBROUTINE AAAAA

INPUT FOR CASE 5

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	-0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-0.0000	28	-0.0000	38	1.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	5.25000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.05000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.10000	.10000

K = 2

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	5.25000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.67500	.15000	.50000	.05000	.05000
3	.59000	.50000	-0.00000	.00000	.00000
4	.80000	.67500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	4.09E-03	-35.59	2.35E-03	-120.74
2	7.29E-03	-64.54	1.27E-03	-159.56
3	6.94E-03	-57.70	1.88E-03	32.13

SUBROUTINE AAAAA

INPUT FOR CASE 6

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	-0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	.1000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.05000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.10000	.10000

K = 2

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.05500	.05000
3	.59000	.50000	-0.00000	.10000	.10000
4	.80000	.67500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	3.13E-03	60.47	2.73E-03	-31.72
2	9.15E-03	-10.21	1.50E-03	-84.26
3	1.05E-02	-38.34	1.75E-03	80.62

SUBROUTINE AAAAA

INPUT FOR CASE 7

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	-0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = / I	1	2	3	4	5	6
1	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000

J = / I	7	8	9	10	11
1	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
2	.50000	.53000	.50000	.05000	.05000

K = 2

J = / I	1	2	3	4	5	6
1	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000

J = / I	7	8	9	10	11
1	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
2	.69500	.59000	.50000	.06500	.06000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

	M = -5		M = 5	
N				
1	4.99E-03	-17.19	2.96E-03	-79.90
2	8.05E-03	-68.00	2.65E-03	-106.86
3	1.03E-02	-105.93	5.86E-04	-153.56

3.2 Primary Subroutine AABAA

Case

1 Inlet stator-rotor interaction, rotor is sound source:

ARMISC(5) = ISOROS = 1.
ARMISC(18) = IAERO = 1.

2 Inlet stator-rotor interaction, inlet stator is sound source:

ARMISC(5) = ISOROS = 1.
ARMISC(18) = IAERO = -1.

3 Rotor-outlet stator interaction, outlet stator is sound source:

ARMISC(5) = ISOROS = 2.
ARMISC(18) = IAERO = 1.

4 Rotor-outlet stator interaction, rotor is sound source:

ARMISC(5) = ISOROS = 2.
ARMISC(18) = IAERO = -1.

3.2.1 Card Image of Main Driver Input

```
AABAA
.2          .0          .35         -1.         1.          .0          .875        10.
.0          15.                                             1.          -1.
.0          1.          2.          2.          .0
2.

    1     1     0
2.          2.                      .0                      .0          .0          2.          .0
2.          2.
.675        .15                     .01                     6.28        .5          .53         .5
.1          .05
.35         .2                                                                      .5
.0          .0
1.          .1                                                                      .56
.2          .1
2.          2.                      .0                      .0          2.          2.          .0
2.          2.
.675        .15                     .01                     6.28        .695        .59         .5
.15         .075
.35         .2                                                          .59         .5
.2          .1
1.          .1                                                          .8          .675
.1          .05
.2            .0          .35         -1.         1.            .0          .875        10.
.0          15.                                                 1.          .0
1.            -1.         2.          2.          .0
2.

    1     1     0
2.          2.                      .0                      .0          .0          2.          .0
2.          2.
.675        .15                     .01                     6.28        .5          .53         .5
.1          .05
.35         .2                                                                      .5
.0          .0
1.          .1                                                                      .56
.2          .1
2.          2.                      .0                      .0          2.          2.          .0
2.          2.
.675        .15                     .01                     6.28        .695        .59         .5
.15         .075
.35         .2                                                          .59         .5
.2          .1
1.          .1                                                          .8          .675
.1          .05
.0            .2          .35         -1.         2.            .0          .875        .0
10.         15.                                                 1.                      .0
-1.         1.          .0          2.          2.
2.

    0     1     1
2.          2.                      .0                      .0          2.          2.          .0
```

```
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.15         .075
.35         .2                                                  .59         .5
.2          .1
1.          .1                                                  .8          .675
.1          .05
2.          2.                  .0                  .0          2.          .0          .0
2.          2.
.675        .15                 .01                 6.28        .63         .5          .5
.2          .1
.35         .2                                                  .59
.2          .1
1.          .1                                                  .675
.2          .1
.0            .2          .35          -1.          2.            .0            .875          .0
10.           15.                                                 1.                          1.
.0            -1.         0.           2.           2.
2.

    0     1     1
2.          2.                  .0                  .0          2.          2.          .0
2.          2.
.675        .15                 .01                 6.28        .695        .59         .5
.15         .075
.35         .2                                                  .59         .5
.2          .1
1.          .1                                                  .8          .675
.1          .05
2.          2.                  .0                  .0          2.          .0          .0
2.          2.
.675        .15                 .01                 6.28        .63         .5          .5
.2          .1
.35         .2                                                  .59
.2          .1
1.          .1                                                  .675
.2          .1
```

3.2.2 Primary Subroutine Input/Output

SUBROUTINE AABAA

INPUT FOR CASE 1

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	-1.0000	25	2.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	10.0000	18	1.0000	28	-0.0000	38	-0.0000
9	0.0000	19	2.0000	29	-0.0000	39	-0.0000
10	15.0000	20	2.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.10000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.20000	.10000

K = 2

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.15000	.07500
3	.59000	.50000	-0.00000	.20000	.10000
4	.80000	.67500	-0.00000	.10000	.05000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M =	-5	M =	5
1	3.17E-03	-105.54	1.28E-02	-67.49
2	1.28E-03	-55.62	2.20E-04	82.98
3	4.04E-05	170.01	9.80E-04	118.40

SUBROUTINE AABAA

INPUT FOR CASE 2

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	.2000	11	-0.0000	21	0.0000	31	-0.0000
2	0.0000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	1.0000	15	0.0000	25	2.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	-0.0000
7	.8750	17	1.0000	27	-0.0000	37	-0.0000
8	10.0000	18	-1.0000	28	-0.0000	38	-0.0000
9	0.0000	19	2.0000	29	-0.0000	39	-0.0000
10	15.0000	20	2.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 1

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	0.00000	2.00000	0.00000	2.00000	2.00000
2	.50000	.53000	.50000	.10000	.05000
3	-0.00000	.50000	-0.00000	0.00000	0.00000
4	-0.00000	.56000	-0.00000	.20000	.10000

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.67500	.59000	.50000	.15000	.07500
3	.59000	.50000	-0.00000	.20000	.10000
4	.80000	.67500	-0.00000	.10000	.05000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

	M = -5		M = 5	
N				
1	4.72E-03	139.39	1.54E-02	174.89
2	3.14E-02	128.49	5.07E-02	132.56
3	7.46E-02	116.52	8.94E-02	114.36

SUBROUTINE AABAA

INPUT FOR CASE 3

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	0.0000	11	-0.0000	21	2.0000	31	-0.0000
2	.2000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	2.0000	15	-0.0000	25	2.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.8750	17	-1.0000	27	-0.0000	37	-0.0000
8	0.0000	18	1.0000	28	-0.0000	38	-0.0000
9	10.0000	19	0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	2.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.15000	.07500
3	.59000	.50000	-0.00000	.20000	.10000
4	.80000	.67500	-0.00000	.10000	.05000

K = 3

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	0.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.15000	.07500
3	.59000	-0.00000	-0.00000	.20000	.10000
4	.67500	-0.00000	-0.00000	.20000	.10000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

	M = -5		M = 5	
N				
1	1.61E-03	-125.08	6.54E-03	71.63
2	8.74E-04	157.03	8.72E-03	133.00
3	4.09E-03	173.56	1.16E-02	-175.00

SUBROUTINE AABAA

INPUT FOR CASE 4

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	0.0000	11	-0.0000	21	2.0000	31	-0.0000
2	.2000	12	-0.0000	22	-0.0000	32	-0.0000
3	.3500	13	-0.0000	23	-0.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	2.0000	15	-0.0000	25	2.0000	35	-0.0000
6	0.0000	16	1.0000	26	-0.0000	36	-0.0000
7	.8750	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-1.0000	28	-0.0000	38	-0.0000
9	10.0000	19	0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	2.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	0.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.15000	.07500
3	.59000	.50000	-0.00000	.20000	.10000
4	.80000	.67500	-0.00000	.10000	.05000

K = 3

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	.01000	-0.00000	0.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.69500	.59000	.50000	.15000	.07500
3	.59000	-0.00000	-0.00000	.20000	.10000
4	.67500	-0.00000	-0.00000	.20000	.10000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -5		M = 5	
1	1.40E-02	-11.73	4.20E-02	23.32
2	3.39E-02	-55.51	1.96E-02	-19.56
3	4.93E-02	-65.46	4.95E-02	157.81

3.3 Primary Subroutine BCDAA

Case

1 Cone model distortion:

ARMISC(22) = 1. = distortion model selector
ARMISC(23) = .95 = maximum distortion
ARMISC(24) = .8 = radial location of maximum distortion

2 Power law distortion model:

ARMISC(22) = 2.
ARMISC(23) = 1. = exponent q
AR(2,12,2) = .1 = a_1, first cosine coefficient of the Fourier series representation of the incident velocity distortion

3 Fourier series coefficient input for incident velocity distortion:

ARMISC(22) = 4. = The Fourier coefficients of the dis-distortion are computed by DISCOEF and ARMISC(22) is reset to 3 before used by subroutine BCDAA

ARMISC(23) = 52. = number of Fourier series coefficients to be computed

ARMISC(24) = 1. = MULTFCT

4 Cone model distortion as in case 1, but use of noncompact source theory:

ARMISC(38) = 1.

3.3.1 Card Image of Main Driver Input

```
BCDAA
                        .35       -1.              .0        .75       .0
.0          15.                                    1.        .0        .0
.0                                                 1.        .95       .8
3.

    0    1    0
2.       2.                                  .0    2.        2.        .0
2.       2.
.675     .15                                 6.28  .73       .61       .5
.065     .06
.35      .2                                        .56       .5
.1       .1
1.       .1                                        .9        .725
.03      .02
                        .35       -1.              .0        .75       .0
.0          15.                                    1.        .0        .0
.0                                                 2.        1.
3.

    0    1    0
2.       2.                                  .0    2.        2.        .0
2.       2.
.675     .15                                 6.28  .73       .61       .5
.065     .06       .1
.35      .2                                        .56       .5
.1       .1
1.       .1                                        .9        .725
.03      .02
                        .35       -1.              .0        .75       .0
.0          15.                                    1.        .0        .0
.0                                                 4.        52.       1.
3.

    0    1    0
17.                                                17.       17.
.0
.675     .1                                  6.28  .73       .62       .5

.35                                                .56       .5

.68                                                .733      .614

.72                                                .754      .628

.74                                                .764      .635

.76                                                .775      .642

.77                                                .780      .645

.78                                                .785      .649
```

.79	.790 .652
.80	.795 .656
.81	.800 .659
.82	.806 .663
.83	.811 .666
.84	.816 .670
.86	.827 .677
.88	.837 .684
.92	.858 .697
1.	.9 .725

15 17

-10.	-9.	-6.	-4.	-3.	-2.	-1.	.0
1.	2.	3.	4.	6.	9.	10.	

.0	.0	.00094	.00282	.00413	.00543	.00641	.00677
.00641	.00543	.00413	.00282	.00094	.0	.0	
.0	.0	.00214	.00659	.00977	.01296	.01534	.01623
.01534	.01296	.00977	.00659	.00214	.0	.0	
.0	.0	.00378	.01202	.01802	.02406	.02862	.03033
.02862	.02406	.01802	.01202	.00378	.0	.0	
.0	.0	.00458	.01477	.02227	.02952	.03559	.03774
.03559	.02952	.02227	.01477	.00458	.0	.0	
.0	.0	.00521	.01706	.02586	.03479	.04158	.04412
.04158	.03479	.02586	.01706	.00521	.0	.0	
.0	.0	.00557	.01851	.02820	.03810	.04563	.04846
.04563	.03810	.02820	.01851	.00557	.0	.0	
.0	.0	.00559	.01887	.02890	.03919	.04704	.05
.04704	.03919	.02890	.01887	.00559	.0	.0	
.0	.0	.00527	.01807	.02782	.03787	.04556	.04846
.04556	.03787	.02782	.01807	.00527	.0	.0	
.0	.0	.00467	.01625	.02516	.03437	.04145	.04412
.04145	.03437	.02516	.01625	.00467	.0	.0	
.0	.0	.00389	.01373	.02137	.02931	.03543	.03774
.03543	.02931	.02137	.01373	.00389	.0	.0	
.0	.0	.00304	.01090	.01705	.02348	.02845	.03033
.02845	.02348	.01705	.01090	.00304	.0	.0	
.0	.0	.00154	.00569	.00900	.01249	.01520	.01623
.01520	.01249	.00900	.00569	.00154	.0	.0	

```
.0          .0          .00061      .00232      .00370      .00517      .00633      .00677
.00633      .00517      .00370      .00232      .00061      .0          .0
```

```
                                .35         -1.                 .0          .75         .0
.0              15.                                             1.          .0          .0
.0                                                              1.          .95         .8
3.
                                                                1.
    0     1     0
2.          2.                                        .0        2.          2.          .0
2.          2.
.675        .15                                       6.28      .73         .61         .5
.065        .06
.35         .2                                                  .56         .5
.1          .1
1.          .1                                                  .9          .725
.03         .02
```

3.3.2. Primary Subroutine Input/Output

SUBROUTINE BCDAA

INPUT FOR CASE 1

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	-0.0000
2	-0.0000	12	-0.0000	22	1.0000	32	-0.0000
3	.3500	13	-0.0000	23	.9500	33	-0.0000
4	-1.0000	14	1.0000	24	.8000	34	-0.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J = / I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.23000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = / I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	3.45E-05	113.90	1.71E-05	-62.43	1.95E-05	121.31

N	M = -8		M = -7		M = -6	
1	1.57E-05	-54.88	1.66E-05	129.00	1.79E-05	-47.07
2			4.19E-05	116.92	1.10E-05	-61.65

N	M = -5		M = -4		M = -3	
1	1.97E-05	136.91	2.19E-05	-39.07	2.43E-05	144.97
2	6.09E-06	115.95	2.39E-06	-87.97	3.16E-06	-7.20
3			2.37E-05	125.25	1.75E-05	-51.00

N	M = -2		M = -1		M = 0	
1	2.66E-05	-30.99	2.90E-05	153.05	3.29E-05	-22.33
2	7.97E-06	157.72	1.33E-05	-22.45	1.75E-05	160.71
3	1.59E-05	132.76	1.57E-05	-43.27	1.70E-05	-38.83

N	M = 1		M = 2		M = 3	
1	4.02E-05	-18.78	5.10E-05	-14.66	6.44E-05	-10.59
2	1.86E-05	165.69	1.56E-05	173.29	9.21E-06	-170.14
3	2.00E-05	146.30	2.53E-05	152.07	3.39E-05	158.25

N	M = 4		M = 5		M = 6	
1	8.05E-05	-6.61	1.01E-04	-2.77	1.27E-04	.89
2	4.83E-06	-74.96	1.70E-05	-21.42	3.14E-05	-7.39
3	4.75E-05	164.57				

N	M = 7		M = 8		M = 9	
1	1.62E-04	4.33	2.07E-04	7.48	2.54E-04	10.30
2	7.31E-05	163.55				

N	M = 10		M = 11	
1	2.42E-04	12.85	1.02E-03	-166.87

SUBROUTINE BCDAA

INPUT FOR CASE 2

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	-0.0000
2	-0.0000	12	-0.0000	22	2.0000	32	-0.0000
3	.3500	13	-0.0000	23	1.0000	33	-0.0000
4	-1.0000	14	1.0000	24	-0.0000	34	-0.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	5.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11	12
I						
1	2.00000	2.00000	0.00000	2.00000	2.00000	-0.00000
2	.73000	.61000	.50000	.06500	.06000	.10000
3	.56000	.50000	-0.00000	.10000	.10000	-0.00000
4	.90000	.72500	-0.00000	.03000	.02000	-0.00000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

	M = -11		M = -10		M = -9	
N						
1	2.16E-03	109.99	9.74E-04	-66.89	8.10E-04	116.02

	M = -8		M = -7		M = -6	
N						
1	7.47E-04	-61.21	7.20E-04	121.38	7.11E-04	-56.27
2			3.25E-03	68.82	1.00E-03	-113.02

	M = -5		M = -4		M = -3	
N						
1	7.15E-04	125.74	7.27E-04	-52.77	7.45E-04	123.03
2	8.07E-04	64.02	7.06E-04	-120.35	6.23E-04	52.81
3			5.41E-04	-153.35	2.56E-04	9.39

	M = -2		M = -1		M = 0	
N						
1	7.59E-04	-51.59	7.58E-04	129.89	7.55E-04	-45.18
2	5.58E-04	-137.84	5.28E-04	30.33	5.16E-04	-155.83
3	1.64E-04	165.60	1.34E-04	-36.12	1.26E-04	-49.01

	M = 1		M = 2		M = 3	
N						
1	7.74E-04	-36.28	8.21E-04	-25.81	8.81E-04	-16.69
2	4.79E-04	-153.82	3.97E-04	-145.27	2.89E-04	-132.91
3	1.23E-04	125.72	1.25E-04	122.98	1.39E-04	113.10

	M = 4		M = 5		M = 6	
N						
1	9.45E-04	-9.60	1.01E-03	-3.99	1.09E-03	.63
2	1.78E-04	-117.79	7.06E-05	-99.54	7.36E-05	125.03
3	2.64E-04	83.14				

	M = 7		M = 8		M = 9	
N						
1	1.16E-03	4.54	1.23E-03	7.90	1.22E-03	10.76
2	1.69E-03	149.72				

	M = 10		M = 11	
N				
1	9.13E-04	13.37	3.26E-03	-166.95

DISTORTION INPUT FOR CASE 3

K = 2

ANGLE = SPAN	-10.0000	-9.0000	-6.0000	-4.0000	-3.0000
.3500	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.6800	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.7200	0.0000	0.0000	.0009	.0028	.0041
.7400	0.0000	0.0000	.0021	.0066	.0098
.7600	0.0000	0.0000	.0038	.0120	.0180
.7700	0.0000	0.0000	.0046	.0148	.0223
.7800	0.0000	0.0000	.0052	.0171	.0259
.7900	0.0000	0.0000	.0056	.0185	.0282
.8000	0.0000	0.0000	.0056	.0189	.0289
.8100	0.0000	0.0000	.0053	.0181	.0278
.8200	0.0000	0.0000	.0047	.0162	.0252
.8300	0.0000	0.0000	.0039	.0137	.0214
.8400	0.0000	0.0000	.0030	.0109	.0171
.8600	0.0000	0.0000	.0015	.0057	.0090
.8800	0.0000	0.0000	.0006	.0023	.0037
.9200	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
1.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000

ANGLE = SPAN	-2.0000	-1.0000	0.0000	1.0000	2.0000
.3500	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.6800	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.7200	.0054	.0064	.0068	.0064	.0054
.7400	.0130	.0153	.0162	.0153	.0130
.7600	.0241	.0286	.0303	.0286	.0241
.7700	.0295	.0356	.0377	.0356	.0295
.7800	.0348	.0416	.0441	.0416	.0348
.7900	.0381	.0456	.0485	.0456	.0381
.8000	.0392	.0470	.0500	.0470	.0392
.8100	.0379	.0456	.0485	.0456	.0379
.8200	.0344	.0414	.0441	.0414	.0344
.8300	.0293	.0354	.0377	.0354	.0293
.8400	.0235	.0284	.0303	.0284	.0235
.8600	.0125	.0152	.0162	.0152	.0125
.8800	.0052	.0063	.0068	.0063	.0052
.9200	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
1.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000

ANGLE = SPAN	3.0000	4.0000	6.0000	9.0000	10.0000
.3500	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.6800	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
.7200	.0041	.0028	.0009	0.0000	0.0000
.7400	.0098	.0066	.0021	0.0000	0.0000
.7600	.0180	.0120	.0038	0.0000	0.0000
.7700	.0223	.0148	.0046	0.0000	0.0000
.7800	.0259	.0171	.0052	0.0000	0.0000
.7900	.0282	.0185	.0056	0.0000	0.0000

.8000	.0289	.0189	.0056	0.0000	0.0000
.8100	.0278	.0181	.0053	0.0000	0.0000
.8200	.0252	.0162	.0047	0.0000	0.0000
.8300	.0214	.0137	.0039	0.0000	0.0000
.8400	.0171	.0109	.0030	0.0000	0.0000
.8600	.0090	.0057	.0015	0.0000	0.0000
.8800	.0037	.0023	.0006	0.0000	0.0000
.9200	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
1.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000

SUBROUTINE BCDAA

INPUT FOR CASE 3

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	-0.0000
2	-0.0000	12	-0.0000	22	4.0000	32	-0.0000
3	.3500	13	-0.0000	23	52.0000	33	-0.0000
4	-1.0000	14	1.0000	24	1.0000	34	-0.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	-0.0000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	17.00000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
2	.67500	.10000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
4	.68000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
5	.72000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
6	.74000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
7	.76000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
8	.77000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
9	.78000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
10	.79000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
11	.80000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
12	.81000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
13	.82000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
14	.83000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
15	.84000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
16	.86000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
17	.88000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
18	.92000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000
19	1.00000	-0.00000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11	12
1	17.00000	17.00000	-0.00000	0.00000	-0.00000	17.00000
2	.73000	.62000	.50000	-0.00000	-0.00000	.10000
3	.56000	.50000	-0.00000	-0.00000	-0.00000	0.00000
4	.73300	.61400	-0.00000	-0.00000	-0.00000	0.00000
5	.75400	.62800	-0.00000	-0.00000	-0.00000	.00181
6	.76400	.63500	-0.00000	-0.00000	-0.00000	.00428
7	.77500	.64200	-0.00000	-0.00000	-0.00000	.00740

8	.78000	.64500	-0.00000	-0.00000	-0.00000	.00975
9	.78500	.64900	-0.00000	-0.00000	-0.00000	.01136
10	.79000	.65200	-0.00000	-0.00000	-0.00000	.01240
11	.79500	.65600	-0.00000	-0.00000	-0.00000	.01272
12	.80000	.65900	-0.00000	-0.00000	-0.00000	.01226
13	.80600	.66300	-0.00000	-0.00000	-0.00000	.01109
14	.81100	.66600	-0.00000	-0.00000	-0.00000	.00943
15	.81600	.67000	-0.00000	-0.00000	-0.00000	.00754
16	.82700	.67700	-0.00000	-0.00000	-0.00000	.00399
17	.83700	.68400	-0.00000	-0.00000	-0.00000	.00165
18	.85800	.69700	-0.00000	-0.00000	-0.00000	0.00000
19	.90000	.72500	-0.00000	-0.00000	-0.00000	0.00000

J =	13	14	15	16	17	18
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00180	.00000	.00179	.00000	.00177
6	.00000	.00427	.00000	.00424	.00000	.00420
7	.00000	.00787	.00000	.00783	.00000	.00776
8	.00000	.00972	.00000	.00966	.00000	.00957
9	.00000	.01132	.00000	.01125	.00000	.01115
10	.00000	.01236	.00000	.01228	.00000	.01218
11	.00000	.01267	.00000	.01260	.00000	.01250
12	.00000	.01221	.00000	.01214	.00000	.01204
13	.00000	.01105	.00000	.01099	.00000	.01090
14	.00000	.00940	.00000	.00935	.00000	.00927
15	.00000	.00751	.00000	.00747	.00000	.00741
16	.00000	.00397	.00000	.00395	.00000	.00392
17	.00000	.00164	.00000	.00163	.00000	.00162
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	19	20	21	22	23	24
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00175	.00000	.00173	.00000	.00170
6	.00000	.00416	.00000	.00410	.00000	.00403
7	.00000	.00767	.00000	.00757	.00000	.00745
8	.00000	.00947	.00000	.00934	.00000	.00919
9	.00000	.01103	.00000	.01089	.00000	.01072
10	.00000	.01205	.00000	.01189	.00000	.01171
11	.00000	.01236	.00000	.01220	.00000	.01201
12	.00000	.01191	.00000	.01176	.00000	.01158
13	.00000	.01079	.00000	.01065	.00000	.01049
14	.00000	.00918	.00000	.00906	.00000	.00892
15	.00000	.00733	.00000	.00724	.00000	.00713
16	.00000	.00388	.00000	.00383	.00000	.00378
17	.00000	.00160	.00000	.00158	.00000	.00156
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	25	26	27	28	29	30
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00167	.00000	.00163	.00000	.00159
6	.00000	.00396	.00000	.00387	.00000	.00378
7	.00000	.00731	.00000	.00716	.00000	.00699
8	.00000	.00903	.00000	.00884	.00000	.00863
9	.00000	.01052	.00000	.01031	.00000	.01007
10	.00000	.01150	.00000	.01126	.00000	.01100
11	.00000	.01180	.00000	.01156	.00000	.01130
12	.00000	.01138	.00000	.01115	.00000	.01090
13	.00000	.01031	.00000	.01010	.00000	.00988
14	.00000	.00877	.00000	.00860	.00000	.00841
15	.00000	.00701	.00000	.00688	.00000	.00673
16	.00000	.00371	.00000	.00364	.00000	.00357
17	.00000	.00153	.00000	.00151	.00000	.00147
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	31	32	33	34	35	36
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00155	.00000	.00150	.00000	.00145
6	.00000	.00368	.00000	.00357	.00000	.00346
7	.00000	.00681	.00000	.00661	.00000	.00641
8	.00000	.00841	.00000	.00817	.00000	.00792
9	.00000	.00981	.00000	.00954	.00000	.00924
10	.00000	.01073	.00000	.01043	.00000	.01011
11	.00000	.01102	.00000	.01071	.00000	.01039
12	.00000	.01063	.00000	.01034	.00000	.01003
13	.00000	.00963	.00000	.00937	.00000	.00910
14	.00000	.00820	.00000	.00798	.00000	.00775
15	.00000	.00656	.00000	.00639	.00000	.00621
16	.00000	.00343	.00000	.00339	.00000	.00330
17	.00000	.00144	.00000	.00140	.00000	.00136
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	37	38	39	40	41	42
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00140	.00000	.00135	.00000	.00129
6	.00000	.00364	.00000	.00321	.00000	.00303
7	.00000	.00619	.00000	.00596	.00000	.00573
8	.00000	.00765	.00000	.00737	.00000	.00709
9	.00000	.00894	.00000	.00862	.00000	.00829
10	.00000	.00978	.00000	.00943	.00000	.00907

11	.00000	.01005	.00000	.00970	.00000	.00934
12	.00000	.00971	.00000	.00937	.00000	.00902
13	.00000	.00851	.00000	.00851	.00000	.00819
14	.00000	.00751	.00000	.00725	.00000	.00699
15	.00000	.00601	.00000	.00581	.00000	.00560
16	.00000	.00319	.00000	.00309	.00000	.00298
17	.00000	.00132	.00000	.00128	.00000	.00124
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	43	44	45	46	47	48
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00124	.00000	.00118	.00000	.00112
6	.00000	.00295	.00000	.00282	.00000	.00268
7	.00000	.00549	.00000	.00524	.00000	.00499
8	.00000	.00679	.00000	.00649	.00000	.00619
9	.00000	.00795	.00000	.00760	.00000	.00724
10	.00000	.00871	.00000	.00833	.00000	.00795
11	.00000	.00896	.00000	.00858	.00000	.00819
12	.00000	.00867	.00000	.00830	.00000	.00792
13	.00000	.00787	.00000	.00754	.00000	.00720
14	.00000	.00672	.00000	.00644	.00000	.00615
15	.00000	.00538	.00000	.00516	.00000	.00494
16	.00000	.00287	.00000	.00275	.00000	.00263
17	.00000	.00119	.00000	.00114	.00000	.00109
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	49	50	51	52	53	54
I						
1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00106	.00000	.00100	.00000	.00094
6	.00000	.00254	.00000	.00240	.00000	.00226
7	.00000	.00474	.00000	.00449	.00000	.00423
8	.00000	.00588	.00000	.00557	.00000	.00526
9	.00000	.00689	.00000	.00653	.00000	.00617
10	.00000	.00756	.00000	.00717	.00000	.00678
11	.00000	.00779	.00000	.00739	.00000	.00700
12	.00000	.00755	.00000	.00716	.00000	.00678
13	.00000	.00686	.00000	.00652	.00000	.00618
14	.00000	.00587	.00000	.00558	.00000	.00529
15	.00000	.00471	.00000	.00448	.00000	.00425
16	.00000	.00251	.00000	.00239	.00000	.00227
17	.00000	.00106	.00000	.00100	.00000	.00095
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	55	56	57	58	59	60
I						

1	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	.00000	.00038	.00000	.00082	.00000	.00077
6	.00000	.00212	.00000	.00199	.00000	.00185
7	.00000	.00393	.00000	.00373	.00000	.00348
8	.00000	.00495	.00000	.00464	.00000	.00434
9	.00000	.00531	.00000	.00545	.00000	.00510
10	.00000	.00639	.00000	.00600	.00000	.00562
11	.00000	.00660	.00000	.00620	.00000	.00581
12	.00000	.00640	.00000	.00602	.00000	.00565
13	.00000	.00583	.00000	.00549	.00000	.00516
14	.00000	.00500	.00000	.00471	.00000	.00442
15	.00000	.00402	.00000	.00379	.00000	.00356
16	.00000	.00215	.00000	.00203	.00000	.00192
17	.00000	.00090	.00000	.00085	.00000	.00080
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

J =	61	62	63
I			
1	17.00000	17.00000	17.00000
2	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000
5	.00000	.00071	.00000
6	.00000	.00172	.00000
7	.00000	.00324	.00000
8	.00000	.00404	.00000
9	.00000	.00476	.00000
10	.00000	.00524	.00000
11	.00000	.00543	.00000
12	.00000	.00528	.00000
13	.00000	.00483	.00000
14	.00000	.00414	.00000
15	.00000	.00334	.00000
16	.00000	.00180	.00000
17	.00000	.00075	.00000
18	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	7.36E-04	144.26	3.55E-04	-33.02	3.14E-04	149.69

N	M = -8		M = -7		M = -6	
1	3.04E-04	-27.61	3.05E-04	155.06	3.11E-04	-22.23
2			7.92E-04	152.52	1.9CE-04	-25.14

N	M = -5		M = -4		M = -3	
1	3.19E-04	160.35	3.26E-04	-17.03	3.29E-04	165.55
2	9.17E-05	156.4C	1.94E-05	-3C.20	4.61E-05	-10.64
3			3.47E-04	160.62	2.33E-04	-16.31

N	M = -2		M = -1		M = 0	
1	3.24E-04	-11.90	3.12E-04	170.62	3.03E-04	-6.91
2	1.07E-04	159.25	1.58E-04	-8.79	1.79E-04	173.55
3	1.89E-04	165.76	1.65E-04	-11.67	1.57E-04	-9.06

N	M = 1		M = 2		M = 3	
1	3.23E-04	-4.49	3.47E-04	-2.12	3.62E-04	.17
2	1.63E-04	176.04	1.15E-04	178.70	5.38E-05	-177.91
3	1.61E-04	173.58	1.78E-04	176.21	2.04E-04	178.73

N	M = 4		M = 5		M = 6	
1	3.66E-04	2.38	3.62E-04	4.49	3.51E-04	6.48
2	9.53E-06	-8.67	6.96E-05	3.20	1.16E-04	6.08
3	2.43E-04	-178.74				

N	M = 7		M = 8		M = 9	
1	3.32E-04	8.30	3.04E-04	9.92	2.58E-04	11.28
2	5.06E-06	116.58				

N	M = 10		M = 11	
1	1.67E-04	12.29	3.53E-04	-167.19

SUBROUTINE BCDAA

INPUT FOR CASE 4

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	-0.0000
2	-0.0000	12	-0.0000	22	1.0000	32	-0.0000
3	.3500	13	-0.0000	23	.9500	33	-0.0000
4	-1.0000	14	1.0000	24	.8000	34	-0.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	0.0000	26	-0.0000	36	-0.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	-0.0000	38	1.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	-0.0000	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	5.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	3.50E-05	106.57	1.72E-05	-63.38	1.60E-05	116.44

N	M = -8		M = -7		M = -6	
1	1.63E-05	-63.16	1.73E-05	117.54	1.83E-05	-61.56
2			4.19E-05	116.82	1.15E-05	-68.91

N	M = -5		M = -4		M = -3	
1	2.06E-05	119.48	2.28E-05	-59.38	2.51E-05	121.85
2	6.53E-06	104.24	2.60E-06	-101.70	3.15E-06	-23.98
3			2.52E-05	115.62	1.91E-05	-66.24

N	M = -2		M = -1		M = 0	
1	2.73E-05	-56.86	2.95E-05	124.51	3.23E-05	-54.25
2	7.97E-06	135.30	1.33E-05	-48.10	1.73E-05	132.62
3	1.74E-05	113.21	1.72E-05	-66.57	1.85E-05	-65.48

N	M = 1		M = 2		M = 3	
1	3.98E-05	-52.08	4.98E-05	-49.99	6.13E-05	-47.73
2	1.81E-05	136.12	1.49E-05	144.24	9.10E-06	167.83
3	2.17E-05	116.75	2.70E-05	119.42	3.54E-05	124.84

N	M = 4		M = 5		M = 6	
1	7.59E-05	-45.34	9.34E-05	-42.80	1.16E-04	-40.07
2	7.79E-06	-112.23	1.89E-05	-68.18	3.11E-05	-48.07
3	4.88E-05	132.98				

N	M = 7		M = 8		M = 9	
1	1.46E-04	-37.08	1.83E-04	-33.71	2.24E-04	-29.58
2	8.91E-05	118.86				

N	M = 10		M = 11	
1	2.16E-04	-22.38	8.99E-04	151.09

3.4 Primary Subroutine BBCAA

Case

1 Base case:

Eddy with axial eddy velocity component only

2 Base case with:

ARMISC(25) = 4. indicates that Filotas lift response function is used

3 Base case with:

ARMISC(38) = 1. indicates that noncompact source theory is used

4 Base case with:

ARMISC(34) = .04 indicates short length eddy

5 Base case with:

ARMISC(34) = 10. indicates long length eddy

6 Base case with angular rather than axial eddy velocity component:

ARMISC(30) = .0 = axial eddy velocity
ARMISC(31) = .05 = angular eddy velocity component
ARMISC(34) = .0 = eddy length for axial eddy velocity component
ARMISC(35) = .4 = eddy length for angular eddy velocity component

Case

7 Base case with both velocity components:

ARMISC(31) = .05 = angular eddy velocity component
ARMISC(35) = 0.4 = eddy length for angular eddy velocity component

8 Base case with:

ARMISC(26) = 1. indicates start of accumulation of mode amplitudes
ARMISC(29) = 3.1416 = angular location of eddy center

9 Base case with:

ARMISC(26) = 3. = end of accumulation of mode amplitudes

10 Base case with:

ARMISC(37) = .8 = time delay resulting from the axial position of the eddy center at the temporal origin

11 Base case with:

ARMISC(34) = 10. = long length eddy
AR(2,2,2) = .1 = average rotor chord length
AR(I,10,2) = .0 = maximum blade camber of rotor
AR(I,11,2) = .0 = rotor blade angle of attack
The data of this case represents the same conditions as case 3 of primary subroutine BCDAA.

3.4.1 Card Image of Main Driver Input

```
88CAA
                        .35       -1.                .0        .75        .0
.0          15.                                      1.        .0
.0
3.                                    .8        .0        .05       .0         .04
.04         .4                        1.
    0     1     0
2.          2.                                  .0        2.        2.         .0
2.          2.
.675        .15                                 6.28      .73       .61        .5
.065        .06
.35         .2                                            .56       .5
.1          .1
1.          .1                                            .9        .725
.03         .02
                        .35       -1.                .0        .75        .0
.0          15.                                      1.        .0
.0
4.                                    .8        .0        .05       .0         .04
.04         .4                        1.
    0     1     0
2.          2.                                  .0        2.        2.         .0
.675        .15                                 6.28      .73       .61        .5
.35         .2                                            .56       .5
1.          .1                                            .9        .725
                        .35       -1.                .0        .75        .0
.0          15.                                      1.        .0
.0
3.                                    .8        .0        .05       .0         .04
.04         .4                        1.                 1.
    0     1     0
2.          2.                                  .0        2.        2.         .0
2.          2.
.675        .15                                 6.28      .73       .61        .5
.065        .06
.35         .2                                            .56       .5
.1          .1
1.          .1                                            .9        .725
.03         .02
                        .35       -1.                .0        .75        .0
.0          15.                                      1.        .0
.0
3.                                    .8        .0        .05       .0         .04
.04         .04                       1.
    0     1     0
2.          2.                                  .0        2.        2.         .0
2.          2.
.675        .15                                 6.28      .73       .61        .5
.065        .06
.35         .2                                            .56       .5
.1          .1
1.          .1                                            .9        .725
```

```
.03      .02
                          .35       -1.                .0        .75        .0
.0         15.                                         1.        .0
.0
3.                                   .8        .0        .05       .0         .04
.04        10.                       1.
    0     1      0
2.       2.                                    .0       2.        2.         .0
2.       2.
.675     .15                                   6.28     .73       .61        .5
.065     .06
.35      .2                                              .56       .5
.1       .1
1.       .1                                              .9        .725
.03      .02
                          .35       -1.                .0        .75        .0
.0         15.                                         1.        .0
.0
3.                                   .8                 .0        .05        .04
.04        .0        .4              1.
    0     1      0
2.       2.                                    .0       2.        2.         .0
2.       2.
.675     .15                                   6.28     .73       .61        .5
.065     .06
.35      .2                                              .56       .5
.1       .1
1.       .1                                              .9        .725
.03      .02
                          .35       -1.                .0        .75        .0
.0         15.                                         1.        .0
.0
3.                                   .8                 .05       .05        .04
.04        .4        .4              1.
    0     1      0
2.       2.                                    .0       2.        2.         .0
2.       2.
.675     .15                                   6.28     .73       .61        .5
.065     .06
.35      .2                                              .56       .5
.1       .1
1.       .1                                              .9        .725
.03      .02
                          .35       -1.                .0        .75        .0
.0         15.                                         1.        .0
.0
3.         1.                        .8        3.1416    .05       .0         .04
.04        .4                        1.
    0     1      0
2.       2.                                    .0       2.        2.         .0
2.       2.
.675     .15                                   6.28     .73       .61        .5
```

```
.065     .06
.35      .2                                          .56      .5
.1       .1
1.       .1                                          .9       .725
.03      .02
                    .35      -1.                      .0       .75       .0
.0         15.                                       1.       .0
.0
3.         3.                .8       .0             .05      .0        .04
.04        .4                1.
    0    1     0
2.       2.                                .0       2.       2.        .0
2.       2.
.675     .15                               6.28     .73      .61       .5
.065     .06
.35      .2                                          .56      .5
.1       .1
1.       .1                                          .9       .725
.03      .02
                    .35      -1.                      .0       .75       .0
.0         15.                                       1.       .0
.0
3.                            .8       .0             .05      .0        .04
.04        .4                1.       .8
    0    1     0
2.       2.                                .0       2.       2.        .0
2.       2.
.675     .15                               6.28     .73      .61       .5
.065     .06
.35      .2                                          .56      .5
.1       .1
1.       .1                                          .9       .725
.03      .02
                    .35      -1.                      .0       .75       .0
.0         15.                                       1.       .0
.0
3.                            .8       .0             .05      .0        .04
.04        10.               1.
    0    1     0
2.       0.                                .0       2.       2.        .0

.675     .1                                6.28     .73      .61       .5

.35      .0                                          .56      .5

1.       .0                                          .9       .725
```

3.4.2 Primary Subroutine Input/Output

SUBROUTINE BBCAA

INPUT FOR CASE 1

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.04E-04	108.46	1.90E-04	-68.03	1.64E-04	115.57

N	M = -8		M = -7		M = -6	
1	1.56E-04	-60.73	1.53E-04	123.07	1.53E-04	-53.03
2			4.53E-04	114.96	1.08E-04	-62.12

N	M = -5		M = -4		M = -3	
1	1.54E-04	130.99	1.54E-04	-44.90	1.53E-04	139.30
2	5.40E-05	119.05	1.66E-05	-72.41	1.36E-05	-24.06
3			1.91E-04	130.31	1.27E-04	-46.01

N	M = -2		M = -1		M = 0	
1	1.49E-04	-36.43	1.42E-04	147.94	1.39E-04	-27.56
2	4.76E-05	148.29	7.09E-05	-29.45	8.03E-05	154.56
3	1.01E-04	137.39	8.73E-05	-37.87	8.19E-05	-33.14

N	M = 1		M = 2		M = 3	
1	1.45E-04	-22.94	1.56E-04	-18.29	1.64E-04	-13.71
2	7.24E-05	159.35	5.02E-05	165.10	2.20E-05	174.58
3	8.37E-05	152.06	9.18E-05	157.54	1.05E-04	163.03

N	M = 4		M = 5		M = 6	
1	1.67E-04	-9.28	1.67E-04	-5.03	1.64E-04	-1.00
2	8.08E-06	-33.64	3.50E-05	-10.21	5.46E-05	-3.42
3	1.26E-04	168.34				

N	M = 7		M = 8		M = 9	
1	1.58E-04	2.76	1.47E-04	6.18	1.27E-04	9.18
2	2.62E-05	173.47				

N	M = 10		M = 11	
1	8.42E-05	11.67	1.83E-04	-166.55

SUBROUTINE BBCAA

INPUT FOR CASE 2

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	4.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	0.25000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9
I			
1	2.00000	2.00000	0.00000
2	.73000	.61000	.50000
3	.56000	.50000	-0.00000
4	.90000	.72500	-0.00000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	2.04E-04	180.00	1.13E-04	0.00	1.14E-04	180.00

N	M = -8		M = -7		M = -6	
1	1.23E-04	0.00	1.36E-04	180.00	1.50E-04	0.00
2			1.07E-03	180.00	3.13E-04	0.00

N	M = -5		M = -4		M = -3	
1	1.66E-04	180.00	1.83E-04	0.00	1.99E-04	180.00
2	2.22E-04	180.00	1.59E-04	0.00	1.02E-04	180.00
3			1.88E-04	180.00	1.64E-04	0.00

N	M = -2		M = -1		M = 0	
1	2.10E-04	0.00	2.13E-04	180.00	2.12E-04	0.00
2	4.64E-05	0.00	5.22E-07	0.00	2.49E-05	180.00
3	1.56E-04	180.00	1.48E-04	0.00	1.42E-04	0.00

N	M = 1		M = 2		M = 3	
1	2.13E-04	0.00	2.15E-04	0.00	2.12E-04	0.00
2	2.12E-05	180.00	2.43E-06	0.00	3.00E-05	0.00
3	1.38E-04	180.00	1.37E-04	180.00	1.41E-04	180.00

N	M = 4		M = 5		M = 6	
1	2.07E-04	0.00	1.99E-04	0.00	1.90E-04	0.00
2	5.10E-05	0.00	5.99E-05	0.00	4.29E-05	0.00
3	1.58E-04	180.00				

N	M = 7		M = 8		M = 9	
1	1.77E-04	0.00	1.60E-04	0.00	1.33E-04	0.00
2	3.03E-04	180.00				

N	M = 10		M = 11	
1	7.32E-05	0.00	2.39E-04	180.00

SUBROUTINE BBCAA

INPUT FOR CASE 3

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	1.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.23000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

/PHASE.GT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.11E-04	100.60	1.92E-04	-68.94	1.69E-04	110.79

N	M = -8		M = -7		M = -6	
1	1.63E-04	-68.92	1.61E-04	111.68	1.62E-04	-67.53
2			4.53E-04	114.93	1.13E-04	-69.63

N	M = -5		M = -4		M = -3	
1	1.62E-04	113.43	1.63E-04	-65.50	1.61E-04	115.65
2	5.81E-05	106.64	1.36E-05	-38.42	1.39E-05	-43.46
3			2.01E-04	120.60	1.35E-04	-61.29

N	M = -2		M = -1		M = 0	
1	1.55E-04	-63.11	1.46E-04	118.17	1.42E-04	-60.16
2	4.92E-05	124.14	7.29E-05	-57.07	8.15E-05	123.94
3	1.08E-04	118.38	9.36E-05	-60.96	8.73E-05	-59.39

N	M = 1		M = 2		M = 3	
1	1.46E-04	-53.11	1.54E-04	-55.75	1.59E-04	-53.14
2	7.24E-05	126.58	4.92E-05	131.27	2.11E-05	143.48
3	8.78E-05	122.31	9.47E-05	126.46	1.07E-04	131.53

N	M = 4		M = 5		M = 6	
1	1.59E-04	-50.51	1.56E-04	-47.76	1.50E-04	-44.87
2	9.95E-06	-80.39	3.50E-05	-51.13	5.28E-05	-41.07
3	1.27E-04	138.78				

N	M = 7		M = 8		M = 9	
1	1.42E-04	-41.31	1.30E-04	-38.52	1.11E-04	-34.93
2	2.72E-05	132.84				

N	M = 10		M = 11	
1	7.34E-05	-30.71	1.62E-04	155.89

SUBROUTINE BBCAA

INPUT FOR CASE 4

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.0400
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.48E-05	108.46	2.11E-05	-68.03	1.82E-05	115.57

N	M = -8		M = -7		M = -6	
1	1.73E-05	-60.73	1.70E-05	123.07	1.70E-05	-53.03
2			5.01E-05	114.96	1.20E-05	-62.12

N	M = -5		M = -4		M = -3	
1	1.70E-05	130.99	1.71E-05	-44.90	1.70E-05	139.30
2	5.98E-06	119.05	1.84E-06	-72.41	2.06E-06	-24.06
3			2.11E-05	130.31	1.40E-05	-40.01

N	M = -2		M = -1		M = 0	
1	1.65E-05	-36.43	1.57E-05	147.94	1.54E-05	-27.56
2	5.27E-06	148.29	7.85E-06	-29.45	8.89E-06	154.50
3	1.12E-05	137.89	9.67E-06	-37.87	9.08E-06	-33.14

N	M = 1		M = 2		M = 3	
1	1.61E-05	-22.94	1.73E-05	-18.29	1.81E-05	-13.71
2	8.02E-06	159.35	5.56E-06	165.10	2.44E-06	174.58
3	9.27E-06	152.06	1.02E-05	157.54	1.17E-05	163.03

N	M = 4		M = 5		M = 6	
1	1.85E-05	-9.28	1.85E-05	-5.03	1.81E-05	-1.00
2	8.95E-07	-33.64	3.88E-06	-10.21	5.05E-06	-3.42
3	1.40E-05	168.34				

N	M = 7		M = 8		M = 9	
1	1.75E-05	2.76	1.63E-05	6.18	1.41E-05	9.18
2	2.90E-06	173.47				

N	M = 10		M = 11	
1	9.32E-06	11.67	2.03E-05	-166.55

SUBROUTINE BBCAA

INPUT FOR CASE 5

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	10.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.05500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	7.01E-04	105.46	3.30E-04	-68.03	2.85E-04	115.57

N	M = -8		M = -7		M = -6	
1	2.71E-04	-60.73	2.66E-04	123.07	2.66E-04	-53.03
2			7.85E-04	114.96	1.87E-04	-62.12

N	M = -5		M = -4		M = -3	
1	2.66E-04	130.99	2.68E-04	-44.90	2.66E-04	139.30
2	9.38E-05	119.05	2.88E-05	-72.41	3.23E-05	-24.00
3			3.31E-04	130.31	2.20E-04	-46.01

N	M = -2		M = -1		M = 0	
1	2.58E-04	-36.43	2.46E-04	147.94	2.41E-04	-27.56
2	8.26E-05	148.29	1.23E-04	-29.45	1.39E-04	154.36
3	1.75E-04	137.39	1.51E-04	-37.87	1.42E-04	-33.14

N	M = 1		M = 2		M = 3	
1	2.52E-04	-22.94	2.70E-04	-18.29	2.84E-04	-13.71
2	1.26E-04	159.35	8.71E-05	165.10	3.82E-05	174.58
3	1.45E-04	152.06	1.59E-04	157.54	1.83E-04	163.03

N	M = 4		M = 5		M = 6	
1	2.89E-04	-9.28	2.89E-04	-5.03	2.84E-04	-1.00
2	1.40E-05	-33.64	6.08E-05	-10.21	9.48E-05	-3.42
3	2.19E-04	163.34				

N	M = 7		M = 8		M = 9	
1	2.74E-04	2.76	2.55E-04	6.18	2.21E-04	9.13
2	4.55E-05	173.47				

N	M = 10		M = 11	
1	1.46E-04	11.67	3.18E-04	-166.55

SUBROUTINE BBCAA

INPUT FOR CASE 6

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	.0500
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	0.0000
5	-0.0000	15	0.0000	25	3.0000	35	.4000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	0.0000	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500.	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.85E-04	-46.02	2.35E-04	137.05	2.10E-04	-39.94

N	M = -8		M = -7		M = -6	
1	2.05E-04	143.03	2.07E-04	-34.05	2.13E-04	148.33
2			6.28E-04	-38.30	1.56E-04	144.31

N	M = -5		M = -4		M = -3	
1	2.19E-04	-28.33	2.26E-04	154.48	2.29E-04	-22.76
2	8.16E-05	-33.92	2.69E-05	142.85	2.29E-05	166.67
3			2.88E-04	-27.72	1.97E-04	154.89

N	M = -2		M = -1		M = 0	
1	2.27E-04	159.98	2.19E-04	-17.31	2.18E-04	165.42
2	6.88E-05	-17.72	1.06E-04	163.93	1.22E-04	-13.58
3	1.62E-04	-22.48	1.44E-04	160.24	1.33E-04	163.08

N	M = 1		M = 2		M = 3	
1	2.29E-04	168.17	2.47E-04	170.90	2.53E-04	173.59
2	1.10E-04	-10.73	7.42E-05	-7.38	2.30E-05	-1.37
3	1.43E-04	-13.95	1.56E-04	-10.91	1.73E-04	-7.88

N	M = 4		M = 5		M = 6	
1	2.62E-04	176.22	2.59E-04	173.79	2.51E-04	-178.74
2	1.97E-05	168.41	6.32E-05	176.37	9.15E-05	179.99
3	2.10E-04	-4.91				

N	M = 7		M = 8		M = 9	
1	2.38E-04	-176.36	2.17E-04	-174.13	1.84E-04	-172.10
2	5.76E-05	-.72				

N	M = 10		M = 11	
1	1.19E-04	-170.34	2.53E-04	10.98

SUBROUTINE BBCAA

INPUT FOR CASE 7

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	.0500
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	.4000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	-0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J = I	1	2	3	4	5	6
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J = I	7	8	9	10	11
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	2.11E-04	9.43	1.02E-04	-170.94	9.03E-05	8.69

N	M = -8		M = -7		M = -6	
1	8.84E-05	-171.66	8.90E-05	8.00	9.08E-05	-172.32
2			3.03E-04	3.97	7.61E-05	-176.55

N	M = -5		M = -4		M = -3	
1	9.29E-05	7.36	9.50E-05	-172.93	9.57E-05	6.79
2	4.15E-05	2.37	1.64E-05	178.55	5.83E-06	-156.64
3			1.32E-04	4.97	9.11E-05	-175.41

N	M = -2		M = -1		M = 0	
1	9.40E-05	-173.48	9.01E-05	6.29	8.32E-05	-173.89
2	2.54E-05	9.19	4.08E-05	-172.39	4.66E-05	7.14
3	7.53E-05	4.30	6.69E-05	-175.35	6.37E-05	-175.85

N	M = 1		M = 2		M = 3	
1	9.12E-05	-174.00	9.61E-05	-174.09	9.82E-05	-174.17
2	4.07E-05	7.11	2.53E-05	7.67	6.24E-06	13.02
3	6.47E-05	4.30	6.91E-05	4.52	7.60E-05	4.77

N	M = 4		M = 5		M = 6	
1	9.69E-05	-174.27	9.31E-05	-174.38	8.74E-05	-174.50
2	1.26E-05	-177.68	2.87E-05	-175.61	3.72E-05	-175.01
3	8.61E-05	4.99				

N	M = 7		M = 8		M = 9	
1	8.00E-05	-174.63	7.03E-05	-174.78	5.71E-05	-174.95
2	3.16E-05	4.09				

N	M = 10		M = 11	
1	3.51E-05	-175.16	7.03E-05	4.59

SUBROUTINE BBCAA

INPUT FOR CASE 8

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	1.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	3.1416	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	6.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES - (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.04E-04	108.47	1.90E-04	111.98	1.64E-04	115.53

N	M = -8		M = -7		M = -6	
1	1.56E-04	119.28	1.53E-04	123.08	1.53E-04	126.98
2			4.53E-04	114.96	1.08E-04	117.89

N	M = -5		M = -4		M = -3	
1	1.54E-04	131.00	1.54E-04	135.11	1.53E-04	139.31
2	5.40E-05	119.06	1.66E-05	107.60	1.86E-05	-24.05
3			1.91E-04	-49.68	1.27E-04	-46.00

N	M = -2		M = -1		M = 0	
1	1.49E-04	143.58	1.42E-04	147.94	1.39E-04	152.44
2	4.76E-05	-31.70	7.09E-05	-29.44	8.03E-05	-25.44
3	1.01E-04	-42.11	8.73E-05	-37.86	8.19E-05	146.86

N	M = 1		M = 2		M = 3	
1	1.45E-04	-22.93	1.56E-04	161.72	1.64E-04	-13.71
2	7.24E-05	159.36	5.02E-05	-14.89	2.20E-05	174.59
3	8.37E-05	152.07	9.18E-05	-22.45	1.05E-04	163.04

N	M = 4		M = 5		M = 6	
1	1.67E-04	170.72	1.67E-04	-5.02	1.64E-04	179.01
2	8.08E-06	146.36	3.50E-05	-10.20	5.46E-05	176.59
3	1.26E-04	-11.66				

N	M = 7		M = 8		M = 9	
1	1.58E-04	2.76	1.47E-04	-173.82	1.27E-04	9.19
2	2.62E-05	173.47				

N	M = 10		M = 11	
1	8.42E-05	-168.33	1.83E-04	-166.55

SUBROUTINE BBCAA

INPUT FOR CASE 9

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	3.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	0.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	4.04E-04	108.46	1.90E-04	-68.03	1.64E-04	115.57

N	M = -8		M = -7		M = -6	
1	1.56E-04	-60.73	1.53E-04	123.07	1.53E-04	-53.03
2			4.53E-04	114.96	1.08E-04	-62.12

N	M = -5		M = -4		M = -3	
1	1.54E-04	130.99	1.54E-04	-44.90	1.53E-04	139.30
2	5.40E-05	119.05	1.66E-05	-72.41	1.86E-05	-24.06
3			1.91E-04	130.31	1.27E-04	-46.01

N	M = -2		M = -1		M = 0	
1	1.49E-04	-36.43	1.42E-04	147.94	1.39E-04	-27.56
2	4.76E-05	148.29	7.09E-05	-29.45	8.03E-05	154.56
3	1.01E-04	137.89	8.73E-05	-37.87	8.19E-05	-33.14

N	M = 1		M = 2		M = 3	
1	1.45E-04	-22.94	1.56E-04	-18.29	1.64E-04	-13.71
2	7.24E-05	159.35	5.02E-05	165.10	2.20E-05	174.58
3	8.37E-05	152.06	9.18E-05	157.54	1.05E-04	163.03

N	M = 4		M = 5		M = 6	
1	1.67E-04	-9.28	1.67E-04	-5.03	1.64E-04	-1.00
2	8.08E-06	-33.64	3.50E-05	-10.21	5.46E-05	-3.42
3	1.26E-04	168.34				

N	M = 7		M = 8		M = 9	
1	1.58E-04	2.76	1.47E-04	6.18	1.27E-04	9.18
2	2.62E-05	173.47				

N	M = 10		M = 11	
1	8.42E-05	11.67	1.83E-04	-166.55

ACCUMULATION OF EDDYS

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	8.08E-04	108.47	3.50E-08	-158.03	3.29E-04	115.57

N	M = -8		M = -7		M = -6	
1	2.63E-08	-150.73	3.07E-04	123.08	2.36E-08	-143.02
2			9.05E-04	114.96	1.67E-08	-152.12

N	M = -5		M = -4		M = -3	
1	3.07E-04	130.99	2.15E-08	-134.90	3.06E-04	139.30
2	1.08E-04	119.05	2.32E-09	-162.41	3.72E-05	-24.06
3			2.66E-08	40.31	2.53E-04	-46.00

N	M = -2		M = -1		M = 0	
1	1.86E-08	-126.43	2.83E-04	147.94	1.53E-08	-117.56
2	5.94E-09	58.30	1.42E-04	-29.45	8.85E-09	64.56
3	1.26E-08	47.89	1.75E-04	-37.87	9.03E-09	-123.14

N	M = 1		M = 2		M = 3	
1	2.90E-04	-22.94	1.49E-08	-108.29	3.27E-04	-13.71
2	1.45E-04	159.35	4.79E-09	75.11	4.40E-05	174.58
3	1.67E-04	152.06	8.76E-09	67.54	2.11E-04	163.03

N	M = 4		M = 5		M = 6	
1	1.35E-08	-99.28	3.33E-04	-5.03	1.08E-08	-91.00
2	6.53E-10	-123.64	7.00E-05	-10.20	3.61E-09	-93.42
3	1.02E-08	78.34				

N	M = 7		M = 8		M = 9	
1	3.15E-04	2.76	7.55E-09	-83.82	2.55E-04	9.19
2	5.24E-05	173.47				

N	M = 10		M = 11	
1	3.09E-09	-78.33	3.66E-04	-166.55

SUBROUTINE BBCAA

INPUT FOR CASE 10

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	.4000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	.8000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	2.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.15000	-0.00000	-0.00000	-0.00000	5.28000
3	.35000	.20000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	.10000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	2.00000	2.00000
2	.73000	.61000	.50000	.06500	.06000
3	.56000	.50000	-0.00000	.10000	.10000
4	.90000	.72500	-0.00000	.03000	.02000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	3.66E-04	108.46	1.72E-04	-68.03	1.49E-04	115.57

N	M = -8		M = -7		M = -6	
1	1.41E-04	-60.73	1.39E-04	123.07	1.39E-04	-53.03
2			4.10E-04	114.96	9.77E-05	-62.12

N	M = -5		M = -4		M = -3	
1	1.39E-04	130.99	1.40E-04	-44.90	1.39E-04	139.30
2	4.89E-05	119.05	1.50E-05	-72.41	1.68E-05	-24.06
3			1.73E-04	130.31	1.15E-04	-46.01

N	M = -2		M = -1		M = 0	
1	1.35E-04	-36.43	1.28E-04	147.94	1.26E-04	-27.56
2	4.31E-05	148.29	6.41E-05	-29.45	7.27E-05	154.56
3	9.13E-05	137.89	7.90E-05	-37.87	7.42E-05	-33.14

N	M = 1		M = 2		M = 3	
1	1.31E-04	-22.94	1.41E-04	-18.29	1.48E-04	-13.71
2	6.55E-05	159.35	4.54E-05	165.10	1.99E-05	174.58
3	7.58E-05	152.06	8.31E-05	157.54	9.53E-05	163.03

N	M = 4		M = 5		M = 6	
1	1.51E-04	-9.28	1.51E-04	-5.03	1.48E-04	-1.00
2	7.31E-06	-33.64	3.17E-05	-10.21	4.94E-05	-3.42
3	1.14E-04	158.34				

N	M = 7		M = 8		M = 9	
1	1.43E-04	2.76	1.33E-04	6.18	1.15E-04	9.13
2	2.37E-05	173.47				

N	M = 10		M = 11	
1	7.62E-05	11.67	1.66E-04	-166.55

SUBROUTINE B8CAA

INPUT FOR CASE 11

ARRAY ARMISC

INDEX	VALUE	INDEX	VALUE	INDEX	VALUE	INDEX	VALUE
1	-0.0000	11	-0.0000	21	-0.0000	31	0.0000
2	-0.0000	12	-0.0000	22	-0.0000	32	.0400
3	.3500	13	-0.0000	23	-0.0000	33	.0400
4	-1.0000	14	1.0000	24	-0.0000	34	10.0000
5	-0.0000	15	0.0000	25	3.0000	35	-0.0000
6	0.0000	16	-0.0000	26	-0.0000	36	1.0000
7	.7500	17	0.0000	27	-0.0000	37	-0.0000
8	0.0000	18	-0.0000	28	.8000	38	-0.0000
9	0.0000	19	-0.0000	29	0.0000	39	-0.0000
10	15.0000	20	-0.0000	30	.0500	40	-0.0000

ARRAY AR

K = 2

J =	1	2	3	4	5	6
I						
1	2.00000	0.00000	-0.00000	-0.00000	-0.00000	0.00000
2	.67500	.10000	-0.00000	-0.00000	-0.00000	0.28000
3	.35000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
4	1.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000

J =	7	8	9	10	11
I					
1	2.00000	2.00000	0.00000	-0.00000	-0.00000
2	.73000	.61000	.50000	-0.00000	-0.00000
3	.56000	.50000	-0.00000	-0.00000	-0.00000
4	.90000	.72500	-0.00000	-0.00000	-0.00000

MODAL AMPLITUDES = (MODULUS,PHASE)

PHASE.LT.180 DEG AND PHASE.GT.-180 DEG

N	M = -11		M = -10		M = -9	
1	7.00E-04	143.18	3.35E-04	-34.10	2.94E-04	148.62

N	M = -8		M = -7		M = -6	
1	2.84E-04	-28.68	2.84E-04	154.01	2.88E-04	-23.31
2			7.78E-04	152.74	1.87E-04	-24.72

N	M = -5		M = -4		M = -3	
1	2.94E-04	159.35	3.00E-04	-18.02	3.02E-04	164.60
2	9.23E-05	157.46	2.27E-05	-23.42	3.91E-05	-13.11
3			3.45E-04	161.26	2.32E-04	-16.20

N	M = -2		M = -1		M = 0	
1	2.97E-04	-12.32	2.86E-04	169.74	2.82E-04	-7.73
2	9.71E-05	167.92	1.44E-04	-9.82	1.64E-04	172.64
3	1.88E-04	166.34	1.65E-04	-11.11	1.56E-04	-8.54

N	M = 1		M = 2		M = 3	
1	2.96E-04	-5.23	3.19E-04	-2.78	3.34E-04	-.40
2	1.49E-04	175.16	1.04E-04	177.75	4.62E-05	-179.22
3	1.61E-04	174.05	1.78E-04	176.62	2.04E-04	179.14

N	M = 4		M = 5		M = 6	
1	3.38E-04	1.90	3.35E-04	4.09	3.26E-04	5.14
2	1.32E-05	-2.27	6.92E-05	3.35	1.10E-04	5.80
3	2.43E-04	-178.45				

N	M = 7		M = 8		M = 9	
1	3.10E-04	8.04	2.84E-04	9.73	2.42E-04	11.15
2	2.75E-05	-174.37				

N	M = 10		M = 11	
1	1.57E-04	12.22	3.33E-04	-167.21

Boeing Commercial Airplane Company

P.O. Box 3707

Seattle, Washington 98124, May 31, 1974.